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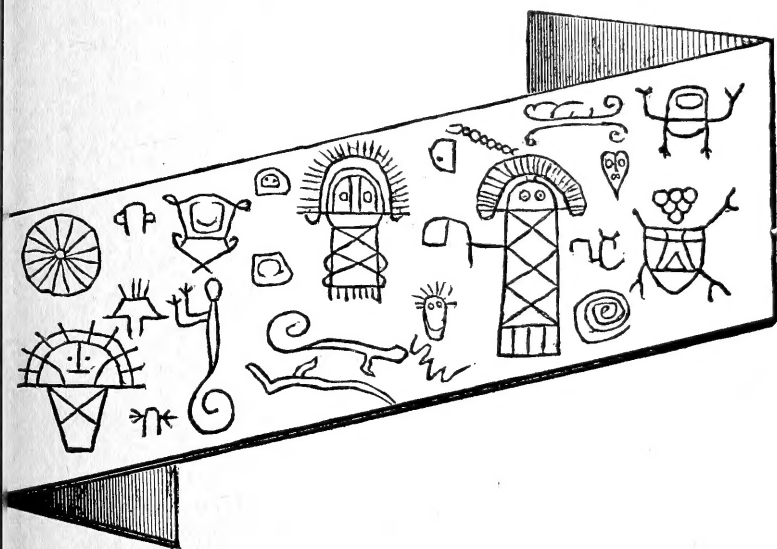
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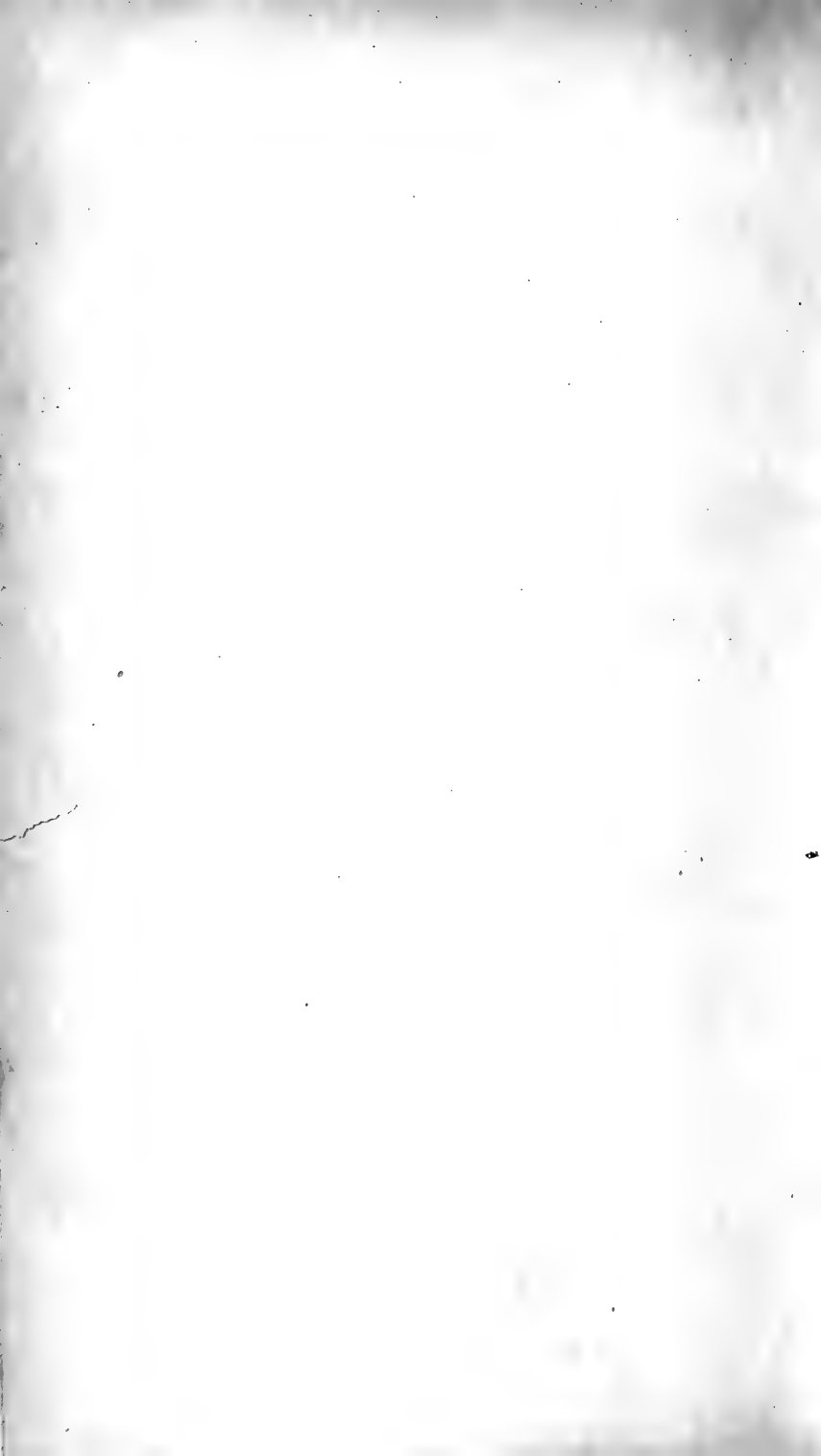
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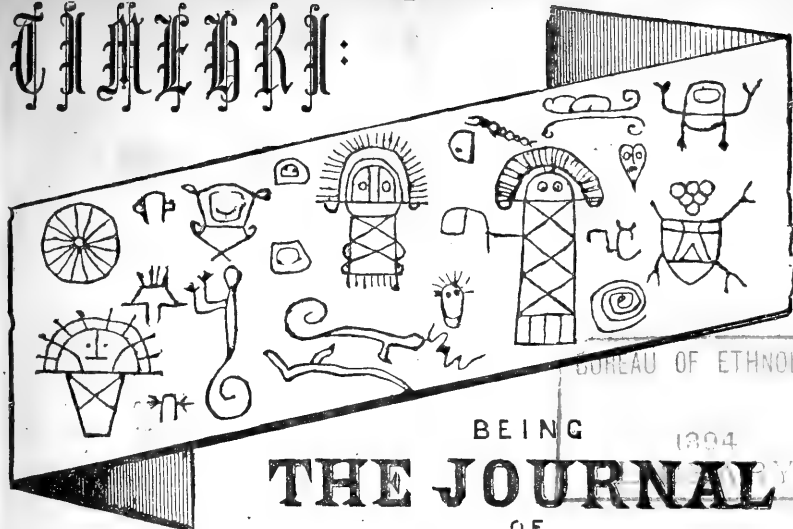
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BUREAU OF ETHNOLOGY,

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OF

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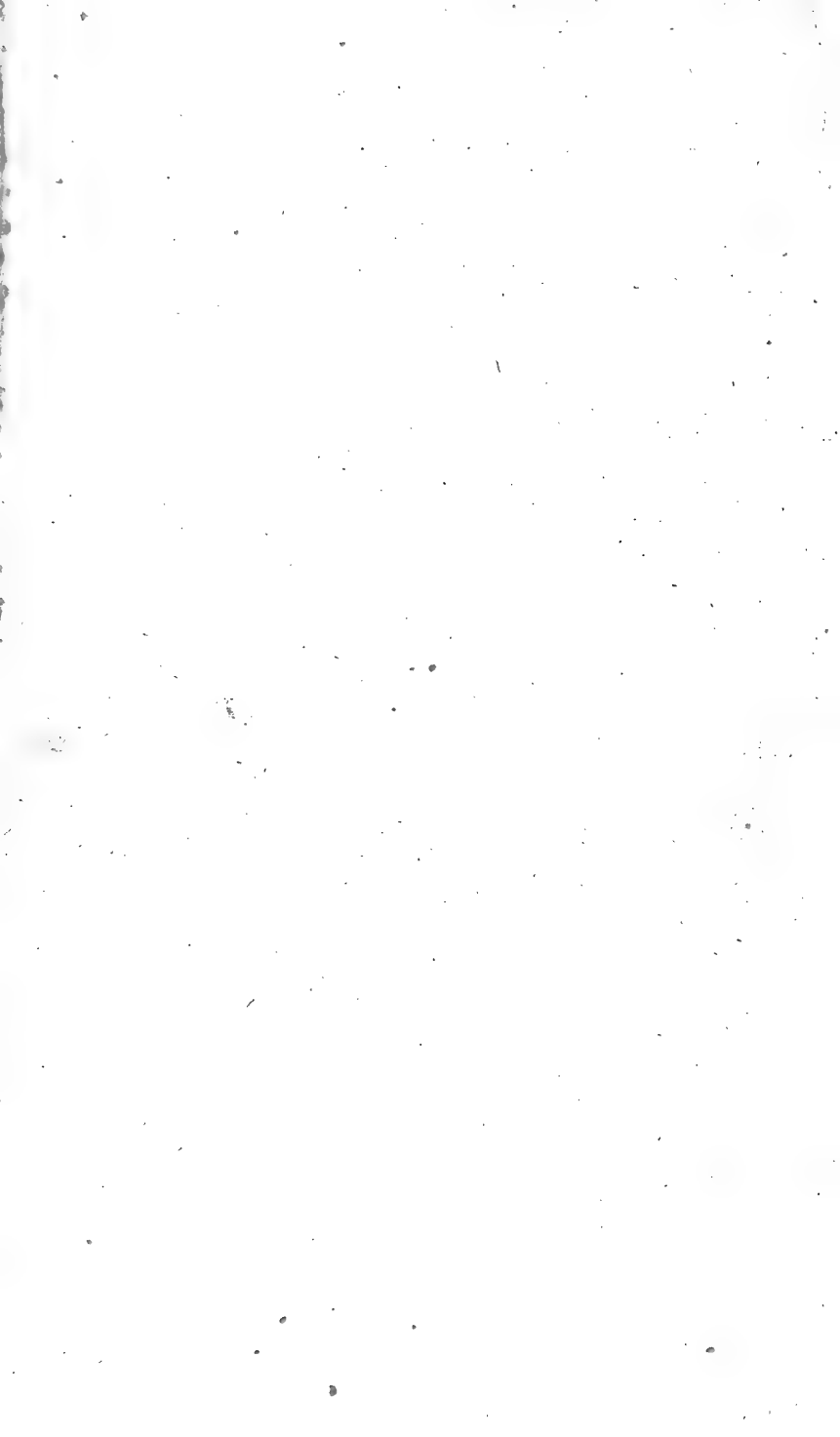
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Diffusion of Sugar Cane, compared with double crushing in Mills.

By Nevile Lubbock.

ANY modification of the present process of cane sugar manufacture or any new process which promises to reduce the cost of production, requires the most careful consideration on the part of planters. Competition, especially when aided by enormous subsidies, as is the case with that which cane sugar producers have to meet, will inevitably leave those behind who do not adopt the most economical means of production. While, however, sugar producers will be wise to adopt any new process which tends to economy, it behoves them to investigate any such new process to the fullest extent, and to satisfy themselves before adopting it that it will in reality conduce to the end sought, and that its promises will not fail to be fulfilled upon its practical adoption.

It is well known that under the system which generally prevails, the quantity of cane juice obtained is considerably below that which actually exists in the sugar cane.

It may be assumed that the sugar cane contains about 87 per cent. of its weight in cane juice. Where

single mills are used the expression of juice during a crop rarely exceeds 66 per cent. of the weight of the cane. In the case of double crushing about 72 to 74 per cent. of juice is obtained.

Whether the existing type of mills, at any rate those in general use in British Guiana, is incapable of improvement may possibly be doubtful; the result of the De Mornay mill seems to shew that the abolition of the trash turner would be attended with decided advantage.

Up to the present, however, it has not been found possible to extract more than 72 to 74 parts of juice from 100 of cane by means of mills.

It is contended that an extraction from the cane equivalent to 85 per cent. of juice can be obtained by means of diffusion.

It may be remarked, however, that in the report on the manufacture of sugar by diffusion at Magnolia estate in Louisiana, during the season 1888-9, by G. I. SPENCER, the returns show that with canes containing 88.9 per cent. of normal juice, the extraction amounted to 83.3 per cent. only. In Demerara, taking a crop through, canes probably do not contain more than 87 per cent. of normal juice; and, assuming the extraction by diffusion to be proportionate to the quantity of juice contained in the cane, the extraction would be reduced below 82 per cent. The canes operated upon at Magnolia were plant canes, which accounts for the high percentage of juice.

The difference, however, between one extraction of 72 per cent., and one of 82 per cent., is obviously very appreciable. A gain of 10 parts on

72 is equivalent to nearly 14 per cent. It would, therefore, appear at first sight, that diffusion ought to be far more profitable than double crushing.

Whether this is really the case, however, obviously depends partly upon the question of the relative cost of the two processes. If the increased cost of diffusion is equal to or greater than the increased gain, there will be no economy in introducing it. Let us endeavour to estimate the increased cost of diffusion as compared with double crushing.

We must consider two cases, one in which a double crushing plant is already in existence, the other in which no plant exists.

In the first case we will assume that the plant is complete but only sufficient for the manufacture of sugar from the juice obtained. If we assume that the cost of crushing the exhausted chips of cane is equal to the cost of crushing the original cane, and that the exhausted chips are double-crushed, the comparison is much simplified. It is perhaps doubtful whether this is so or not, but probably the difference will not be great either way, and in the absence of sufficient experience it seems at present the safest course to assume that the cost of the one is equal to the cost of the other.

In the case of diffusion we have (1) the cost of the plant, (2) the increased cost of working it, (3) the cost of increased quantity of fuel due:—

- (a) to the increased evaporation,
- (b) to the diminished value of the megass as fuel,
- (4) the cost of packages for the increased quantity of produce, (5) the cost of drogherage of the increased

produce to ship-board, to set against the increased quantity of sugar.

We may, perhaps, add the loss which might arise from an increased liability to stoppages arising from mishaps. Any such stoppages are as a rule costly both in labour and fuel. It is, however, too soon to calculate the value to be attached to this. The difficulties attending the starting of a new process and getting the hands well acquainted with the work required of them, are always considerable, and it would not be fair to assume that because stoppages of various kinds have frequently arisen in factories where diffusion has been tried, they may not with more experience be got rid of altogether.

If we take the case of a factory making 2,000 tons of all sugars at present with double crushing, it seems possible to estimate roughly what the value of the increased sugar would be, and what would be the cost of obtaining it.

We have already stated that it is claimed that the diffusion juice obtained from the cane is equivalent to an extraction of 85 per cent. of original juice. It may, perhaps, be open to doubt whether the methods of analysis and calculation by means of which the result of 85 per cent. is obtained, are absolutely reliable. A very slight inversion in the sugar contained in the exhausted chips would lead to very erroneous conclusions if polariscopic indications of the cane sugar contained in such juice are taken as the indication of the extraction. We think, therefore, that an expression of 82 per cent., in view of the Magnolia results, is as high as it is at present safe to calculate upon.

Taking as our basis of comparison an extraction of 82 per cent. for diffusion against 72 per cent. for double crushing, we have a gain in quantity of 14 per cent. of sugar, this on a crop of 2,000 tons of all sugars represents 280 tons of sugar with its proportionate quantity of molasses or rum. A fair valuation of 1 ton of sugar with its offal would be about £15, and 280 tons at £15 will amount to £4,200.

The cost of the necessary diffusion plant may be taken at about £16,000 and the interest and wear and tear of this we will assume at ten per cent., or £1,600 per annum.

The next item of expense will be the cost of the extra fuel required. In the case of double crushing the megass obtained forms a valuable fuel, and with the assistance of about 5 cwts. of coal per ton of sugar, is sufficient for the manufacture of the sugar and rum produced. It seems at present doubtful whether the exhausted chips even when double-crushed are of any value as fuel. This is, however, rather a difficult question. At Aska and we believe in Java the exhausted chips have been spread in the sun to dry and subsequently utilised as fuel; the amount of labour required for this purpose is very considerable and puts entirely out of the question this method of dealing with the chips in British Guiana. In this colony they are passed through a mill, or even double-crushed, and are no doubt after such treatment available as fuel and theoretically of considerable value for this purpose. There is, however, much greater difficulty in burning cane refuse in this finely comminuted condition than in the case of either single or double-crushed megass. The particles being small fall

readily through ordinary grate bars, and they lie packed so closely together that the free passage of the air required for combustion is impeded. Hence if their theoretical value as fuel is to be made available, some special arrangement of furnace will have to be adopted. We do not doubt that this will be done, as there does not appear to be any greater inherent difficulty in rendering these chips available as fuel than in the case of sawdust. If we assume that their theoretical value can be utilised, let us try to estimate this, and compare it with the fuel value of megass from mills with an extraction of 72 per cent. With such an extraction every 100 lbs. of cane yields 28 lbs. of megass, this megass contains 13 lbs. of woody fibre and about 2.6 lbs. of sugar. The woody fibre and sugar together contain about 7.65 lbs. of carbon. With diffusion the sugar in the megass practically disappears altogether and we have the 13 lbs. of woody fibre per 100 lbs. canes containing $6\frac{1}{2}$ lbs. of carbon. Thus assuming the quantity of water per lb. of carbon is the same in double-crushed megass and double-crushed chips, the value of the fuel in the two cases will be as 7.65 is to 6.50, or as 100 is to 85 nearly, per 100 lbs. canes.

It will be more convenient, however, for our purpose, if we compare the value of these chips with that of double-crushed megass per ton of sugar made.

In the case of double crushing, 11 tons of canes will give 1 ton of sugar in British Guiana and these 11 tons of canes will give 3.08 tons of megass: 4.4 tons of such megass are equivalent to 1 ton of coal (I assume that 1 lb. of such megass will evaporate 1.36 lbs. of water,

1 lb. of coal evaporates 6 lbs.); 3.08 tons are therefore equivalent to 15.4 cwts.

Assuming that with diffusion we should obtain 14 per cent. more sugar, 9.6 tons of canes will produce 1 ton of sugar, and if we assume that the canes contain 13 per cent. of woody fibre and that the double-crushed chips contain 50 per cent. of water, these 9.6 tons of canes will produce 1.87 tons of megass or double-crushed chips. These chips, if the percentage of water is the same as that in double-crushed megass, should be as valuable as fuel lb. for lb.; taking therefore 4.4 tons of such megass as equivalent to 1 ton of coals, 1.87 tons are equivalent to 8.27 cwts.

Let us turn now to the increased evaporation required in the case of diffusion, per ton of sugar; but we may remark in passing that in addition to this, the water of diffusion has to be kept hot during the whole time diffusion is going on, and that this must involve a continued loss by radiation and otherwise, thus necessitating an expenditure of fuel over and above what would be required for evaporation and cleaning alone. A ton of sugar with fairly good juice can be obtained from 1,700 gallons. With a dilution of 30 per cent. 2,210 gallons would be required or an addition of 510 gallons of water. Assuming that 1 lb. of coal will evaporate 12 lbs. of water, we shall require 425 lbs. of coal or 3.77 cwts. per ton of sugar to bring the juice to its normal density. We have already seen that the theoretical loss in the value of fuel per ton of sugar amounts to $15.4 - 8.27 = 7.13$ cwts. adding to this the ... 3.77 "

we have a total quantity of 10.90 cwts. or say, 11 cwts. per ton of sugar, over and above, what is now required. We may fairly value this 11 cwts. at present at 19/-

It will be remarked that allowing 5 cwts. of coal per ton of sugar with double crushing, and estimating the megass as equivalent to 15 cwts. per ton of sugar, the equivalent of 1 ton of coal is consumed per ton of sugar made including its proportion of rum. In the case of diffusion the calculation allows an equivalent of 23.77 cwts.

Most practical planters in British Guiana will be disposed, we believe, to think that the value of diffused chips as fuel is much over-estimated in the foregoing calculation; and we freely admit that, at any rate in the Western Hemisphere, the value of diffused chips as fuel has not been demonstrated; and that, according to public report, the quantity of coal actually consumed, where diffusion has been practically carried out, has been largely in excess of the quantity set down.

The increased cost of labour is the next item. The cost of labour for manufacture in the buildings is usually about \$3 per ton of sugar made. We believe that \$4.50 per ton made is a fair estimate of the cost with diffusion. This is an increase of \$1.50 or 6/3 per ton of sugar.

We have lastly the cost of packages for the increased quantity of sugar made, which we may put at 14/- per ton of sugar including the rum puncheons—if no rum is made the cost would be higher—and drogherage to ship which varies considerably on different estates, probably \$2 or 8/4 per ton is a fair average figure.

Summing up we have value of			
increased product ...	...		£4,200
Less :			
Interest and wear and tear ...	£1,600		
Fuel, 2,280 tons sugar at 19/-			
per ton ...	...	2,166	
Extra labour, 2,280 tons at 6/3			
per ton ...	...	712 10s.	
Packages, 280 tons at 14/- per ton	196		
Drogherage, 280 tons at 8/4 per			
ton ...	...	116 10s.	4,791
			<hr/>
Loss ...		£ 591	<hr/>

If these figures are fairly correct, there does not appear to be any advantage in adopting diffusion on estates where a satisfactory double crushing plant already exists.


In the case where no plant exists, diffusion would compare rather more favourably as the required machinery could be somewhat more cheaply erected, than in the case where it must be in the form of additional machinery. The difference, however, would not be very appreciable. Moreover, the fact that a larger capital must be locked up in a diffusion plant than in a double-crushing plant, would deter most people from adopting diffusion, even though the increased profit left a fair rate of interest on the extra capital employed. So long as bounties are allowed to continue, cane sugar production must be looked upon as an extra hazardous industry, and a proportionate profit will be looked for before capital is embarked.

In the foregoing calculations we have endeavoured to make the comparison as fairly as possible between the two methods. We are well aware that those who are partisans of diffusion will think that the increased quantity of sugar which can be obtained is greater than that set down, they may also perhaps take a different view of the fuel question, as also that of labour. On the other hand, it is fair to point out that as much as 74 per cent. of juice has been obtained by double crushing and that there is room for some diminution in the fuel with this process. We have endeavoured, however, to avoid taking extreme figures and we believe that those set down are as close to what may be reasonably expected as the present state of our knowledge admits.

Further experience will, however, shortly be forthcoming, and prudence suggests that it would be wise to await this experience before embarking capital in diffusion.

Charles Waterton and his Demerara Friend.

By James Rodway, F.L.S.

O the thousands of readers of that delightful book "Waterton's Wanderings," any little contribution to the personal history of its author will, no doubt, be interesting, and as I have come across some particulars concerning "the most valued friend he ever had in the world," CHARLES EDMONSTONE, it has been thought desirable to bring them before the readers of *Timehri*.

In Demerara we see around us the beautiful scenes which the traveller and naturalist so vividly described, and in a walk along the West Coast, may observe the descendants of the curri-curris, egrets and spurwings which he admired so much. In a few hours' journey up the Demerara river we may reach the Camouni Creek, pass through its affluent the Warratilla, and follow the windings of that little stream into the Mibiri, where WATERTON spent many happy days in the enthusiastic study of the forest creatures he loved so much. The house is gone, and there is nothing remaining of the wood-cutting establishment, but the forest remains and the fauna is still the same. The howling of the red monkey, the barking of the toucan and the screaming of flocks of parrots overhead, may be heard and appreciated to-day as they were eighty years ago. At night, when lying in our hammocks we can compare the voices of the owls and goat-suckers with the description in the *Wanderings*, and listen to their weird cries of "Whip poor Will," "Who are you," and that other wailing

series of notes which he so well describes as like "the departing voice of a midnight murdered victim." Daddy QUASHIE is gone, but there are plenty of his successors to guide the traveller through the forest, and help the huntsman in finding out the lurking places of the acourie and labba. At Soesdyk the descendants of that LOUISA BACKER who prepared WATERTON'S dose of castor oil, are doing business as boat-builders, while some of the older people still remember having heard of the traveller.

CHARLES WATERTON sailed from Portsmouth in the ship *Fame*, Captain BRAND, on November the 29th, 1804, and arrived in Stabroek after a passage of about six weeks, that is, in January, 1805. His uncle, CHRISTOPHER WATERTON, was proprietor of the two plantations La Jalousie and Fellowship on the West Coast, and his father having lately bought an estate for the benefit of his younger children, CHARLES was sent out to superintend the property. His uncle appears to have gone to England soon afterwards, leaving his nephew in charge of La Jalousie and Fellowship as *q. q.* or attorney, in which capacity he acted until 1812, with the exception of short intervals during which he made one or two trips to England.

How his uncle found his way to Demerara is thus told in WATERTON'S "Autobiography":—

"My father's sister was remarkably handsome. As she was walking in the Streets of Wakefield, a gentleman, by name DALY, from Demerara, met her accidentally and fell in love with her: they were married in due course of time, although the family was very much averse to the match. Soon after this my father's younger brother, who had no hopes at home on account

of the penal laws, followed his sister to Demerara, and settled there."

I have been unable to find the date of the marriage and departure, but it was probably about 1773. Mr. MICHAEL DALY, the uncle of WATERTON was a very influential planter in Demerara in the latter half of the last century; his father was JOHN DALY, Senior, who owned *Parica*, while his brother JOHN was proprietor of *Schoon Ord*, and himself of *Bellevue*. His name does not appear as Member of the Court of Policy, probably on account of his religion, a Roman Catholic not being permitted under the regulations of the colony, to hold any post of honour or profit. He died about 1788 leaving several children.

About 1790, CHRISTOPHER WATERTON married the widow BIRMINGHAM, daughter of Dr. JOHN WADDELL, and thus became possessed of *La Jalousie & Fellowship*, two of the finest estates in Demerara. A *Land-brief* was granted to him on February 1st, 1791, for Pln. *La Jalousie*, and a year or two later he applied for and received second depths of both his plantations. Under the British rule, in 1797, CHRISTOPHER WATERTON was elected a Financial Representative for Demerara, and at a meeting of the Combined Court on August 2nd, he spoke in favour of some acknowledgment being given to Captain ROCHELLE and the Dutch soldiers who had lately done such good service to the colony by defending the Morocco Post against the Spaniards. The Colonial Chest was empty and it was decided that a tax of £2 15 should be raised on all ordinary slaves without distinction of age, and double for those who were tradesmen not belonging to plantations. Mr. WATERTON then

submitted that, although no sum had been put on the estimate for the soldiers and officers who had so gallantly repulsed the enemy from Morocco, he was of opinion that a surplus would arise from the proposed tax, and the inhabitants would approve that something be given to Captain ROCHELLE and his gallant soldiers. His proposition was accepted and carried out at a later meeting.

The colony was at this time a field for party strife. There had always been two great divisions, the English and Dutch, but now the latter had become divided into those favourable to the Prince of Orange and the republicans. As may be supposed, the English and the Orange party were agreed, and being in the majority, managed to keep Liberty, Equality, and Fraternity in the background. CHRISTOPHER WATERTON in his position as estate proprietor and slave-owner was naturally against unbridled license. In 1795, he with the other planters on the West Coast had suffered severely from a slave insurrection, and at one time it appeared as if the colony was to be another St. Domingo. However, the revolt was put down with a strong hand, and things in general became more settled under the English rule.

CHARLES WATERTON on his arrival necessarily joined the Militia and was soon made Lieutenant ; he appears to have led a very quiet life altogether, performing the duties of an estate's attorney and spending his leisure time in studying the habits of the birds which frequent the mud flats in front, or the swampy savannahs behind the estates. Being in the position of a slave-owner, he naturally had his opinions on the vexed questions of the

time, abolition and emancipation. The reasonings of such a just and benevolent character are naturally worthy of note, and as they probably represent the views of a good master, the following extract will be interesting:—"Slavery can never be defended; he whose heart is not of iron can never wish to be able to defend it: while he heaves a sigh for the poor negro in captivity, he wishes from his soul that the traffic had been stifled in its birth; but unfortunately, the governments of Europe nourished it, and now that they are exerting themselves to do away with the evil and ensure liberty to the sons of Africa, the situation of the plantation slaves is depicted as truly deplorable, and their condition wretched. It is not so. A Briton's heart, proverbially kind and generous, is not changed by climate, or its streams of compassion dried up by the scorching heat of a Demerara sun; he cheers his negroes in labour, comforts them in sickness, is kind to them in old age, and never forgets that they are his fellow creatures."*

Up the Mibiri Creek lived CHARLES EDMONSTONE, and here WATERTON'S future wife was born in 1812. The concession was named Warrow's Place, and stood on a slight elevation above the swamp, through which meandered the tortuous creek. It was not a plantation but a wood-cutting establishment, standing quite alone, there being no inhabitants living nearer than the mouth of the Camouni. Here WATERTON spent the intervals between his forest wanderings, in the pleasant company of his most valued friend and that gentleman's family. It has been stated that he had a liking for little ANNE when he saw her as a child, but however that may have

* Wanderings Second Journey.

been, the lady afterwards had all the advantages of an European education, and no doubt was very different from the little forest maiden of Mibiri Creek.

Captain EDMONSTONE was a tall man with a martial countenance, looking as if born a commander. His character was, like that of his friend, thoroughly honest, and this is shown in all his dealings with the Indians, as well as the bush negroes captured in his various expeditions. He was well acquainted with the forest, and for about fifteen years was concerned in all the different raids upon runaway slaves. From about the year 1770 there had been continued trouble with the negroes in Demerara. A few runaways would collect together on one of the various sand reefs behind the sea coasts of Demerara and establish a small settlement, from which they made incursions into the neighbouring plantations, carrying off provisions and often inducing other slaves to go with them. The free coloured people generally sympathised with the runaways and on pretence of going up the creeks to fish, carried supplies and traded for such things as they raised in their provision grounds or collected from the bush. On the West Coast, the settlements of bush negroes were situated in the district where the three creeks of Camouni, Hoobabo and Boerasirie take their rise. On the East Coast, the settlements were scattered aback of the estates from the upper Madewinie as far as the Abary. Throughout these districts swamps extend in every direction, with here and there a slight elevation of sand. On these little islands the runaways built huts like the Indian benabs, and planted various ground provisions in the neighbourhood, while the swamps were used for rice cultivation. The foot path was generally under

water, and laid out so as to require great skill on the part of the Indians to find the way. The whole of the settlement was surrounded by a circle of sharp stakes, which being under water effectually prevented an enemy from penetrating inside except through the winding path, which was concealed by lines of similar stakes. Only Indians could find these hidden passages, and without these people nothing could have been done to suppress the evil. Every effort was therefore made to conciliate the various tribes by means of presents, which in 1812 became such a burden to the colony that Governor CARMICHAEL was compelled to stop these subsidies except in the shape of payment for services actually performed. The Indian chiefs were rather important personages in those times, as they received the annual presents and distributed them to a considerable extent by favour. It naturally followed, that being commissioned by the government and provided with a silver-headed stick of office, an Arrawack chieftain thought himself a somebody. In the latter half of the last century a daughter of one of these *Owls*, as they were called, who went by the name of "Princess MINDA" was married to WILLIAM REID, a Scotchman, and one of their children became Mrs. CHARLES EDMONSTONE. The gallant Burgher-Captain was therefore connected by marriage with the Arrawacks and no doubt this was one reason why he had such great influence over them.

The Burgher-Captain of the time had a great number of duties to perform: he was really the medium of communication between the Government and the citizens. Once a quarter he had to collect a sort of census return of the people, produce of their plantations and a number

of other particulars. In such a large district as that of the Upper Demerara this was no light matter. If they should come to his house he would be bound to entertain them, as it would not be in accordance with the rules of hospitality to send them away at once when their business had been transacted. Every Publication of the Governor and Court had also to be distributed, and as these publications were written, they had to be sent from one plantation to another, each proprietor endorsing the single copy with his name or that of the estate. At regular intervals the Militia were called together for drill and the Burgher-Captain was responsible for that also. Sometimes the Court of Policy wanted the opinion of the Burghers on some particular matter, or there was an election of a Keyser, and all these things necessitated a boat and negroes as well as great loss of time. The public services of CHARLES EDMONSTONE, appear to have been done thoroughly, and were much appreciated.

The first important expedition of EDMONSTONE is so well described in the Wanderings that it is unnecessary to repeat it here, but there were several others not mentioned by WATERTON, in which he showed his courage and endurance. As some of these will probably be interesting as pictures of circumstances which can never recur, and as they are all concerned with CHARLES EDMONSTONE, no apology is needed for their introduction.

On the 27th of October, 1802, EDMONSTONE wrote the following letter to the English Governor :—

“ I think it my duty from the observations I made in my late expedition to represent the alarming opera-

tions of the Maroon slaves, who from being molested have extended a continuous line of communication from close to Stabroek almost up to the Loo plantation, through which they seem to have a regular correspondence, and seem extending up the country as much as they can, and endeavouring to plant provisions for themselves, in which case unless rooted out before they gain too great a head to be overcome, will become a most serious evil that will not be avoided without great trouble and expense. Their correspondence is so extensive that they pass in large bands across the head of Mahyka so far as Berbice, in such force that the Indians and others are often obliged to fly and give way to them.

“As soon as Your Excellency and the Honourable Court have consulted on the subject, I find myself so far recovered of my wound as to say I shall be happy once more to go out in the service of the colony.

“I have sent an express to the Postholder, FEEDKOW; as soon I hear from him or see him (I suppose by Sunday) I will do myself the honour to wait upon Your Excellency to receive your commands, as it is impossible to cross the country to Mahyka in its present state. There are about forty Indians desirous of joining us if Your Excellency would please to give the necessary orders to Mr. BUCHANAN to collect them for the purpose, to join at any appointed day.

“I cannot help taking notice to your Excellency and Honourable Court of a scandalous report with regard to the Black Troops that were with me,—that they had abandoned me in the woods,—which was circulated as far as Berbice. I think it therefore my duty to declare that their conduct was highly meritorious, and did

honour to the Corps to which they belong. As it is an insult to Colonel HISLOP, I hope the authors of the report will be traced and obliged to ask pardon of the Colonel, and also be obliged to go out on the first expedition against the Maroons."

As a result of the above letter, an expedition was fitted out early in November which arrived at the mouth of the Camouni on the 11th. It consisted of 50 non-commissioned officers and privates of the 11th W.I. Regiment under the command of Captain MACRAE, Captain EDMONSTONE and four other gentlemen with twelve of their trusty negroes, well armed, the Indian Captain CORROWELL, with sixteen other Indians, and Lieut. BROUGHTON, Commander of H.M. Brig *Staunch*, with a Sergeant and six marines. The "indefatigable zeal and activity" of EDMONSTONE procured sufficient boats in a few hours to convey the party up the Creek, and also provided thirty-six negroes to carry five days' provision. This expedition scoured the country from the source of the Camouni to the head of the Boerasirie, destroying several camps and taking a number of prisoners.

On the 28th April, 1807, Governor BENTINCK informed the Court of Policy that Mr. CHARLES EDMONSTONE; notwithstanding his ill-health from the wound received in a former expedition, had again come forward to lead the late expedition, had actually shared in all the danger and fatigue incident thereto, and had directed everything with so much perseverance that the almost inaccessible recesses of the Maroons had been discovered and totally destroyed. The Governor was of opinion that the fresh services lately rendered, and the

repeated proofs he had given of his readiness to sacrifice his health and expose his life for the preservation of the inhabitants of this colony, gave him a just claim to the Court's consideration. After deliberation it was resolved to forward to Captain EDMONSTONE the thanks of the Court, and as a further token of their sense of his services to procure a silver vase of the value of a hundred guineas, with a proper inscription, to be presented to him when it should arrive from England.

The expedition in question had been arranged in such a manner that by one party under Capt. GRAVESANDE proceeding up the Mahaica Creek and the other under EDMONSTONE up the Madewinie, the bush negroes would be easily surrounded. The expenses amounted to $f13,105\cdot2$ (about £1,100); among the items being one of $f825$ to LOVE ANN JORDAN for attending JOHN HADFIELD who had received a wound in the expedition, and another of $f1,100$ to DR. LLOYD for medicine and attendance for the same person. Five of the officers who had been reported as having merited the thanks of the Court, were each to be presented with a gold medal of the value of twenty guineas.

Perhaps the most important of these expeditions was that of 1809. About September of that year the planters of the West Coast of Berbice were considerably alarmed at the number of desertions continually taking place, and on enquiry found that a camp of Bush Negroes were settled on a sand reef up the Abary creek, whence they visited the estate and enticed the negroes to run away. As this was such a serious matter, and the runaways were located on Demerara territory, the Berbice authorities represented the case to the sister

colony and it was agreed that expeditions should be sent out by both colonies. Accordingly CHARLES EDMONSTONE was appointed to lead the Demerara contingent which resulted in a very great success. The following is one of the reports of the Captain to Governor BENTINCK, read in the Court of Policy on January 18th 1810:—

“My former despatches from Mahaicony would acquaint you of my succeeding equal to my most sanguine expectations; for, on holding out a promise of freedom, 23 negroes surrendered; 43 were surprised while concerting on the proffered terms, 10 were taken prisoners and 26 more were killed, making altogether 102. The conditions on which they surrendered were, besides a free pardon of life or corporal punishment, that they are never to be returned to their former owners, but be sent from the colony and disposed of in some of the adjacent islands. These I conceive are agreeable to your Excellency's wishes, and are strictly the conditions. I trust that as I have pledged *my word of honour*, no objection will be made by any member of the Court, for I must candidly assure your Excellency that were these negroes left alone the consequences would be serious, not only to that colony, but to this also. Such however is the confidence I have in the negroes brought in, that with all due deference to your Excellency and the Honourable members of the Court, I beg to suggest that 20 or 25 might be selected to act as guides, or to form part of a Yager Corps to assist in any future expedition. I consider it highly necessary that two of the negroes should be sent immediately from Mahaicony with an offer of pardon to the remainder, and in two weeks after, a

party to receive them, and destroy all their provision and rice grounds ; this mode I am convinced will be attended with success.

“ I leave to your Excellency’s judgment to determine whether the 43 that were surprised are entitled to the grace offered in your pardon. The quantity of rice the bush negroes have, just rising from the ground, is very considerable, independent of yams, tannias, plantains, tobacco, &c., and as it will be three months before the rice is fit to gather I would recommend at that period that another expedition be sent to destroy the same, under the command of one of the gentlemen who so readily volunteered their services on the last occasion. I cannot conclude without mentioning my obligations to Major BRANDT and L. AVERY ESQ., to whom it devolved to destroy all the provisions that could be met with ; this they did most effectually, fourteen houses filled with rice and several fields in cultivation being by their exertions totally destroyed. Mr. AVERY is particularly entitled to the notice of your Excellency and the colony, for during the time we were at Mahaicony fourteen of his negroes were constantly employed in attending the expedition for upwards of four weeks, and he must have been at considerable expense in entertaining those gentlemen who had occasion to assemble at his house. I take upon me to say, from these gentlemen’s report, that on a moderate calculation, the quantity of rice destroyed (independent of ground provision) would have been enough to support 700 negroes for twelve months. I further beg leave to observe to your Excellency and the Honourable Court, that by information from the prisoners, a general revolt on the windward part of

this colony and the west sea coast of Berbice would have taken place, had your Excellency not so promptly adopted the expedition, the result of which I hope will be satisfactory."

The Court thanked the Governor for his zeal and energy, and resolved that their thanks be given to Captain EDMONSTONE for the alacrity with which he had again come forward and taken charge of the party who went to the woods, and in order to testify in the most gratifying manner their high estimation of his services, it should be proposed to the Financial Representatives at the next Combined Court, to unite in granting Captain EDMONSTONE exemption from Colonial Taxes for the period of his life.

The expenses of this expedition amounted to the large sum of £100,000, and the Colony Chest being empty, the Governor was obliged to borrow £19,000 from the Orphan Chamber to pay the Indians for their services. Some difficulty occurred in adjusting the share of Berbice, but it was at length decided that the whole cost should be divided between the two colonies in the proportion of one third to Berbice and the remainder to Demerara. To pay the latter, a produce tax was imposed in Demerara and Essequibo.

The great difficulty that remained was the disposal of the prisoners. The Berbice planters wanted to get their slaves back, but in accordance with EDMONSTONE'S terms this could not be granted. It was decided that the Governor should try to sell them in some of the West India Islands, but none of the colonies would allow them to be brought within their jurisdiction. The Governor tried Trinidad and Martinique, and sent a

special Commission to St. Croix, but without effect. Then he asked the military authorities at head-quarters in Barbados to buy them as pioneers, but this was also refused. Meanwhile they had been first put on board some vessels in the river, and ultimately most of them were kept prisoners and placed with the chain gang, while 38 were sent to work at Post Morocco.

Among the captives were two infants whose parents had been killed. On the 29th of January the Governor stated to the Court, that he understood Mr. EDMONSTONE was willing from motives of humanity to take charge of these children, and had intimated his readiness to pay whatever value the Court might place on them. After deliberation it was decided that as these infants could not come under the regulation as to banishment, Mr. EDMONSTONE should be allowed to retain them as his property without any payment.

Another interesting matter in this connection shows the good feeling that often existed between master and slave. A negro named TONY, the property of Mr. AVERY, had acted as guide to the expedition and rendered himself eminently useful. With a view of rewarding him for his diligence the Court proposed to buy him from his master and grant him his freedom. The master was willing to part with him on these terms, but the slave stipulated that the manumission should not be granted until such time as he should point out. From affection to Mr. AVERY, TONY was perfectly satisfied and desirous of remaining with him as long as he should be in the colony. The slave received the promise, which he petitioned the Court to perform several years afterwards when his master went to England, and a proper manu-

mission was then granted. As a further mark of the Court's approbation TONY was allowed to retain as his wife one of the prisoners taken during the expedition.

In the "Wanderings," WATERTON speaks of a gold-hilted sword having been presented to EDMONSTONE. Up to 1810 this sword had not been received in the colony and the matter was referred to in the Court on January 31st of that year. It was observed by a member that the swords which had been awarded to Mr. C. EDMONSTONE and the late Mr. VAN DER LOTH for services in an expedition against runaways in November 1802, had never been obtained. The Colonial Receiver had paid the amount granted into the hands of Mr. VAN DE VELDEN, but owing to the war the order had not been forwarded. The Court resolved that Mr. VAN DE VELDEN be requested to refund the money, and in order that Mr. EDMONSTONE and the heirs of Mr. VAN DER LOTH may no longer be disappointed, the Secretary, Mr. P. F. TINNE, who was shortly proceeding to England, be required to order two richly double gilt sabres, with belts and other accoutrements, of the value of £50 each, with proper inscriptions. On the 5th of December following, the Governor reported that the swords and the piece of plate granted in 1807 had at last come out, and would be shortly presented.

On the first of August, 1810, EDMONSTONE was appointed Protector of Indians in the Demerara River. The post was then at Mora, and the Post-holder Mr. BREMNER, who had lately been promoted from Mahaica. As his assistant he had the Indian SIMON, who received a salary of *f*22 per month in consideration of his services in several bush expeditions, with the proviso that he be

always ready to assist the colony when his services should be required. EDMONSTONE sent in a report on the Post on October 31st, in which he recommended its removal to the Rock Saba, and that a proper house and logie be built. Numbers of Indians from the interior often came to the Post in a most deplorable state of starvation, and he wanted a supply of plantains, or if the Court thought better a number of the chain gang negroes to plant and weed a piece of cassava ground. He further referred to the necessity of providing accommodation when the Indians visited Stabroek, as they were exposed to ill-treatment from ignorant persons. The muskets given to them often got out of order and he would be glad to have a person at the Post who could repair them. The Indians complained to him that they were grieved to find they were not treated by the British Government with as much consideration as they had been by the Dutch, who gave them more presents than they now received. The Court allowed the removal and erection of buildings, granted permission to purchase provisions when necessary, and ordered that the armourer of the Militia should repair the muskets of the Indians free of charge.

EDMONSTONE was consulted in nearly everything connected with the Indians. One of the most interesting stories of the time is that of MANARIWAU the Carib Chief who came to make a treaty with the Governor on behalf of what he reported to be a great nation, and to offer a supply of Indian slaves.

On the 29th of October, 1810, the Governor reported to the Court that a Chief of the Caribs had lately arrived accompanied by a numerous following. An Indian

had come to town about six months before in the character of an Ambassador from the Great Indian Chief, making grand representations, but having little appearance to warrant his pretensions. The Governor had not given much credit to his assertions, and told him that to discuss such important business required the presence of his chief. The Ambassador had then received some presents and returned to the woods. Now that the Chief had arrived it became absolutely necessary to come to some determination on the matter. As to selling their Indian prisoners for slaves in these colonies, this could not be allowed, but some means must be devised to satisfy them, and prevent their attacking the Indians near the back lands or murdering their prisoners, which they threatened to do if presents were not given them. Considering their well-known hatred of these friendly tribes and their ferocious dispositions, there could be little doubt that they would execute their threats to the fullest extent if not satisfied. He was not in favour of their being allowed to settle in the neighbourhood of the colonies, nor that their alliance should be courted for internal defence. Their restless dispositions could not but make them troublesome neighbours, while the assistance of the Indians in the back lands was always sufficient for what was required. With regard to what the Chief stated of his nation having formerly been of great use to the colony, this had been certainly the case when it was lawful to employ the other tribes as slaves, the Caribs being very useful in procuring them; now, however, this was not applicable, since the trade had been prohibited. Previous to taking any resolution he considered it expedient for the Court to hear what the Chief had to say.

A message having been sent, MANARIWAU appeared, in the Court, accompanied by several of his relatives, a number of musicians and other attendants. Through the medium of an interpreter he was questioned and made sensible of the utter impossibility of his being allowed to sell his prisoners in the colony. After some discussion it was agreed that the Court should give him and his people such articles as he had demanded, and that the same kinds of presents would be distributed annually when called for, also that a person should be sent with him to report on the condition of his nation and the number of people for whom presents should be provided. In consideration of this the Chief solemnly pledged himself not to make war upon the Indians residing in the back lands or connected with this colony; that he would spare the lives of his prisoners and use them as domestics; and finally that he and his people would behave themselves peaceably and amicably towards the whites and those who lived under their protection, expecting in case he should be molested, such redress from the Government as might be justly due.

After the Chief had left the Court a vote was passed for £12,620 (about £1,050) to buy guns, powder and shot, cutlasses, knives, beads and corals, linen and salempores, looking-glasses, axes, hats, salt, 2 parasols, iron pots, crockery, &c. EDMONSTONE was deputed to distribute these presents, the Court being persuaded from the experience they had of the public spirit of that gentleman that the matter could not be entrusted into better hands.

It appeared afterwards that the Chief had made a misrepresentation of his power and importance, as the

Post-Holder who went up the Essequibo to see and report on the great Carib nation found the usual collection of Indian benabs ; the only riches being the presents which the party had succeeded in procuring from the colony. The system of annual presents became so burdensome to the colony, that Governor CARMICHAEL in 1813 was obliged to put a check on the demands of the Indians, after which time the expense was gradually reduced. The following extract from one of CARMICHAEL'S speeches will show his opinion on the matter :—

“I have also much gratification in acquainting you with an extract from His Lordship's (Secretary of the Colonies) letters relative to the Indians and the presents heretofore granted them by the colony. The tone of demand held by some of those people as I understood it on former occasions, as well as on their last visit, made me think it my duty to state the matter to His Majesty's Government, as I did not consider it justifiable in an acting Governor,—without special orders or actual treaties, properly ratified by authority—to admit the principle, or consent to any part of His Britannic Majesty's possessions in my charge submitting to pay tribute or an annual stipend to any nation or body of people whatever ; either to deprecate their animosity or purchase their friendship ; particularly as from the language of the last five Chiefs who came down with 300 followers, on being told that there were no presents for them replied, they could wait no longer, they had waited long enough, and if they got nothing they would make prisoners and sell them. I told them that if they talked that way they must go back immediately and that it was the orders of the

Governor that they were not to attempt to make war or prisoners, at their peril. I immediately communicated with Mr. EDMONSTONE, the circumstances and the reason of their dismissal without any gifts, and directed that those gentlemen to whose care these people are committed and to whom with good reason the tribes in his vicinity were personally attached, to impress upon them more fully the impropriety of their demands, and that nothing but their services, and proofs of friendly disposition by good behaviour, could ever induce the Colony to bestow gifts upon them, except on such occasions and at such times as the Government might think proper, or when the Indians deserved them. I felt the more necessity to use such precaution upon these points, as however insignificant or trivial they might appear at the commencement, they would possibly in a few years, or even a shorter period, become a very great inconvenience and be attended with unpleasant consequences."

The last Bush expedition in which EDMONSTONE appears to have been concerned, took place in October, 1814. One of the Indians reported that thirty runaways had located themselves within a days' journey from Warrow's Place, and that most of them had guns. EDMONSTONE organised the expedition, which consisted of the Post-holder, several gentlemen, and eighty Indians, under the command of Lieut. LEES. Under the guidance of the Indian who had discovered the camp, they started on the 4th of October, and found no very great difficulties in marching through the bush and over the savannahs. At nightfall the party encamped, and the following morning at dawn they proceeded to surround the settlement of the runaways. Their project was how-

ever discovered by a negro sentry, who pointed a gun at one of the Indians, telling him to come on, for they were quite ready. This precipitated matters; the sentry was killed and a free fight ensued, in the course of which two more of the runaways were killed, several wounded, and seven captured. The others managed to escape, and the forest was scoured in every direction without success. However, after the return of the party, EDMONSTONE sent one of the prisoners with a proclamation of pardon if they surrendered, and this resulted in the return of nineteen runaways.

These expeditions, with others organised in Essequibo, gave the death-blow to most of the Maroon settlements in the colony. EDMONSTONE had scoured the country from the upper Boerasirie to the Abary, and now special precautions were taken against future desertions. The planters were required to keep their negroes from the bush, not even allowing them to fish or cut troolies, for which purpose it was advised to employ Indians. The Hoobabo Creek was visited continually, especially on Sundays, when every negro or coloured person was required to give an account of himself. By these measures and strict attention on the part of the Boerasirie Post-holder, the great lurking place for the runaways was rendered unsafe. When it is considered what horrible crimes resulted from the congregation of Maroons in Surinam and Jamaica, we cannot but feel that the leader of these expeditions is deserving of remembrance in the colony.

In all his actions he showed a kindly spirit towards the prisoners, while his behaviour to the Indians was strictly honourable. On the last occasion, in writing to

the Court of Policy, he spoke very strongly of his promises to the Indians, and declared that he would see them paid if he had to do it from his own pocket. The Court thought this needlessly strong language, and granted the amount required without further trouble, at the same time thanking him for his services.

Lord BATHURST in writing to Governor MURRAY in 1815 thus expressed his opinion on the bush expeditions :—

“ I entirely approve of your measures for finding out if there are any settlements of bush negroes in the interior likely to be dangerous, and learnt with great pleasure that their number was not such as to excite alarm, and that they submitted with a slight show of resistance. Your humanity in extending the reward for unmaimed prisoners and withdrawing the encouragement, which, to the disgrace of the colony, it had been usual to give to acts of wanton cruelty, is approved. Considering your opinion that these unfortunate persons had been driven by the cruel treatment of their masters to take refuge in the woods, and that they had committed no crime except desertion, and that they surrendered without actual resistance, they might have been merely restored to the estates and not made to work in chains.”

From the concluding sentences of the above it appears that the Colonial Secretary, like so many other Englishmen at that time, knew nothing of the real state of affairs. Very little can be said on the slavery question in the present article, but the matter of desertion may be aptly compared with what we know of school-boys and apprentices, who often run away on the slightest pretexts.

From EDMONSTONE to bush negroes and thence to slavery, may be thought out of place here, but really a great deal more might be said in these matters. We have read of man-hunters in such books as "Uncle Tom's Cabin;" I have attempted to sketch another type; this is true to life whatever Mrs. STOWE'S character *may be*.

Near the border of the clearing at Warrow's Place lived the eccentric Swedenborgian, "Old GLEN." His story was a curious one. Coming to Demerara as the mate of a merchant vessel, he received a grant of land, settled down, bought a few negroes, and in seven years gained an assured position, while after twenty years he became a man of some importance. Going on board a Dutch vessel one day he found the Captain reading one of SWEDENBORG'S books, and being taken with the new religion GLEN was very pleased when the owner presented him with several works of that mystic author. From this time he became an enthusiast. His estate was neglected, everything went wrong, the negroes ran away or became careless and lazy, and every day GLEN became poorer and poorer. Having ordered a large consignment of the books of his beloved author, he was unable to pay for them, and consequently the estate was sold. Being destitute he set up as a preacher to the negroes, but this not being allowed, he went to Berbice and enlisted as a private soldier. Here he fell into disgrace for sleeping on duty and was sentenced to "run the gauntlet." In pity the commanding officer would have remitted the sentence, but GLEN refused, and was so determined to receive his punishment that he would not pass his comrades until they gave him the customary blows, even going so far as to chide them if they did not strike hard

enough. Returning to Demerara EDMONSTONE found him destitute and offered him a home at Warrow's Place. GLEN would not live in the house but built himself a benab in the forest. He was very gentle and kind to the Indians, many of whom came to him for medical treatment, which he practised by means of some of the forest remedies. Among other kind actions he taught the little EDMONSTONES their letters, and Mrs. WATERTON probably received the rudiments of her education from him.

With such a friend as EDMONSTONE, the traveller must have learnt a great deal of the Indians, and probably this friendship helped him in his long journeys. Far away in the interior the knowledge of the Protector of Indians had been carried to different tribes, and naturally they were glad to do anything for his friend. After WATERTON'S return from his first journey he took home the despatches to Lord BATHURST, in which Governor CARMICHAEL spoke of his travels and the resources of the colony. In a despatch dated April 21st, 1813, the Secretary for the Colonies said His Royal Highness the Prince Regent was satisfied with the Governor's account of the fertility and resources of the colony, and was anxious that every endeavour should be made to supply corn and rice to the West Indies, the war with the United States having stopped the supplies. The Indians should be encouraged by proper rewards to the industrious, and be provided with seeds and implements of husbandry. Specimens of the many varieties of woods were wanted. The illness of Mr. WATERTON had hitherto prevented him from availing himself of that gentleman's local knowledge, and he was therefore only able to recom-

mend to the Governor's serious consideration the possibility of deriving from the colony supplies of provisions and lumber, which would not only greatly enhance the value of the colony, but would lay the foundation of a solid prosperity to the Empire, by rendering the other possessions less dependent on the United States.

CHARLES EDMONSTONE returned to Scotland between 1816 and 1820 and the wood-cutting establishment was carried on for some years afterwards by ROBERT EDMONSTONE and Company, but it does not appear that Warrow's Place ever afterwards became anything but the abandoned wilderness which WATERTON so well describes. ROBERT WATERTON, the last representative of the traveller's family in Demerara, died in 1837, and some years afterwards the estates passed entirely out of the family.

A handwritten signature in cursive script that reads "Charles Waterton" followed by a stylized flourish.

[THE AUTOGRAPH OF CHARLES WATERTON.]

Mollusca of British Guiana,

By the Editor.



THE present communication deals with but the land and freshwater forms of this group, since up to the present, no detailed examination has been made of the marine species. As a group of beings, the Mollusca or shell-fish, as the more common forms are generally termed, are entitled to a considerable degree of attention from a practical stand-point. In nearly all the tropical portions of the globe, various forms, chiefly of the marine shell-secreting species, have become the bases of by no means unimportant industries; while in temperate as well as tropical climes, a very considerable number furnish food, not only highly nutritious but in a few cases, as in the Oyster, almost unsurpassed for its delicacy.

For a long time a small species of Cowry has been utilised, in portions of W. Africa, as the medium of exchange, and was imported in large quantities from the Eastern seas; the great Fountain-shells or Strombs, the Helmet-shells, and the large Cowries are choice subjects for the costly cameos, and for this purpose are largely imported into Europe; the fine thread-like and silky attachments of the great Wing-shells have been utilised for the manufacture of various fancy articles; the Pearl and Mother-of-pearl shells form the staple of extensive trades for the manufacture of jewelry and other ornamental or useful articles; while an enormous number of other species are normal articles of house

decoration, among which special forms, such as the Pearly Nautilus, the Ear-shells, the Top-shells, etc., when cleaned of the outer and earthy-looking layers so as to lay bare the under nacreous and iridescent substance, yield articles of ornament unsurpassed for beauty by any other of the multitudinous productions of nature or of art.

In the utilisation of the Molluscs for food, a world-wide appreciation is given to the various species of Oysters; but the Whelks, Periwinkles, Sea-cars, Clams, Mussels etc., are also variously esteemed in civilised communities; while among primitive races the commonly occurring species of the locality furnish a normal and welcome article of diet.

Apart from their economic importance, however, the group of the shells has for ages been regarded with popular interest, as subjects for collection, for which their varied form and colouring, their wide distribution, and the ease with which they may be preserved, admirably fit them; and the large prices, sometimes as much as fifty pounds, which have at times been paid for certain rare individual species, often of small size, will give some idea of the estimation in which they were and are still held by special collectors.

It is to the biological student more particularly, however, that the group of the Mollusca presents the highest degree of interest; for not only does the highly specialised plan of organisation which is presented by the group, furnish him with an endless field of research in its origin and history and its many degrees of modification, but the occurrence of special characteristic types of structure in the various

strata of the sedimentary rocks furnish often most valuable confirmatory evidence for the stratigraphical arrangement of the rock formations; while in many of the calcareous formations, the remains of shells form an appreciable amount of the rock. At the present day, too, the distribution of the land and freshwater Mollusca, especially in insular areas, lends a not inconsiderable amount of assistance in determining the relation of the land areas in former ages.

The land and freshwater Mollusca of British Guiana, when compared with those occurring in close-lying districts, are, so far as they are known, few in number; but this is certainly largely due to the want of investigation, for with the exception of the list, given in SCHOMBURGK'S "Reisen in Britisch Guiana," of the 22 species met with by him during his travels, there has been no serious attempt to throw light upon this branch of Natural History. Lately, from specimens of 24 species which have been collected for the British Guiana Museum, it has been possible to extend the list of our forms, since but two (*Melania atra* and *Anodonta ensiformis*) out of the 24, are certainly identical with species obtained by SCHOMBURGK; and more than seven other genera are now for the first time recorded from the colony. It has not been possible in the present communication, in the absence of specimens and suitable books, to give a revision of the species mentioned by SCHOMBURGK; but the following list of recently identified species is given as a basis for future work. With the exception of the testiferous slug, and an additional species of *Bulimus*, the specimens have all been identified by Mr. EDGAR SMITH, F.Z.S., etc., etc., Conchologist of the British Museum of

Natural History, to whom I desire to express my hearty acknowledgment.

UNIVALVES (*Gasteropoda*.)

1. *Ampullaria glauca*, Linné.
2. „ *cornu-arietes*, Linné.
3. „ *peristomata*, d'Orb.
4. „ sp. (*papyracea*?)
5. *Melania atra*, Rich.
6. „ *circumsulcata*, v.d. Busch.
7. *Streptaxis deformis*, Fer. (= *S. glabra*, Pfeiff.)
8. *Bulimus oblongus*, Müll.
9. „ *fraterculus*, Pfr.
10. „ *bensoni*, Reeve.
11. „ sp.
12. *Stenogyra octona*, Chemnitz.
13. „ *goodalli*, Müll.
14. „ *beckiana*, Pfr.
15. *Leptinaria lamellata*, Pot. et. Mich.
16. *Vaginula occidentalis*, Guilding.
17. *Parmacella* sp. (?)
18. *Physa* sp.
19. *Hyalina* sp.

BIVALVES (*Lamellibranchiata*.)

20. *Hyria schomburgkiana*, Sow.
21. *Prisodon latialata*, Sow.
22. *Paxyodon latilobiata*, Sow.
23. *Anodonta ensiformis*, Spix.
24. „ sp.

Of the Univalves, the Black-shells (*Melania*) and the Apple-snails (*Ampullaria*) are aquatic, and breathe by means of plume-like or pectinated gills, which are

specialised portions of the *mantle*, or that integumentary layer that covers over the viscera of the body and secretes the shell of the *Mollusca*. By the folding of the mantle over the neck of the animal, a large chamber is formed for the gills, and water is admitted and driven from this chamber for respiratory purposes.

A most noteworthy feature in connection with the respiratory system of the Apple-snails, is the existence of a capacious pulmonary air-chamber situated above the branchial chamber, and opening directly into it by a small hole in the front towards the left side. By certain writers this chamber has been treated as equivalent to a swim-bladder or float, but as its walls are richly supplied with vessels leading to the expanded auricle of the heart, its functions are evident. In the large specimens of the *Ampullaria glauca*, the details of its structure are easily made out. If the animals are kept under observation, they will frequently be seen ascending to the surface and pumping in air by means of the siphonal neck-lappet, even though the water in which they are living be well aerated for branchial respiration. This additional pulmonary chamber is extremely suggestive in its relation to the development of that of the true air-breathing forms, such as the land-snails and slugs etc., in which gills are never developed; while it helps to explain the survival of the animals when purposely kept for long periods, in some cases even for years, out of water.

Both in the *Melantias* and *Ampullarias*, when the body is retracted into the shell, the aperture is closed by a horny plate or *operculum* which is secreted by the

posterior end of the broad walking base—the so-called *foot* of the Mollusca.

The Melanias, which are widely distributed along the banks of the great rivers, and are especially numerous in certain places among the rapids of the Essequibo, are easily distinguished by their elongated, and turreted spiral shells, the aperture of which is nearly oval, and pointed above. Often the shells are markedly eroded by the action of the water, and may even become truncated. *Melania atra* is long, and strongly ribbed; while *M. circumsulcata* is shorter and rounded, and not ribbed.

The Ampullarias are more or less globular, with a small spire, and have the aperture wide and open, corresponding to the swollen body-whorl. The surface is striated and generally marked with a variable number of bands. They are abundant in weedy ponds and trenches; burying themselves in the mud during drought, and depositing their egg capsules in little elongated masses upon plants and other objects raised above the water-level. Two species are very widely distributed along the coast, the more common (*Ampullaria glauca*) having a thick, strong shell, with a wide and open hollow axis to the spire—the axis being thus *perforated* or *umbilicated*—and depositing green eggs; while the less common (*A. papyracea*?) has a thin, weak shell, with a very narrow fissured axis—thus being *rimate*—and depositing pink eggs. The shells of the latter species brought from the shallow ponds of the Rupununi savannah, where the supply of carbonate of lime is evidently very small, are peculiarly thin and brittle.

In the well-marked species, *A. cornu-arietes*, the shell

is discoidal, the coils taking place in one plane. They have been obtained from the ponds on the savannahs of the interior. In *A. peristomata*, in which the shells are ventricose, the surface markings are linen-like.

The true Snails, the Pond-snails and the Slugs, are easily distinguished by their breathing air directly in a pulmonary chamber, formed by a folding of the mantle—similar in its development to the folding that gives rise to the branchial chamber in the gill-bearing forms such as the Apple-snails—and by the absence of a shelly operculum.

In *Streptaxis*, the shell is nearly globular, and the axis of the spire is distorted, that of the lower not agreeing with that of the upper whorls, and giving an oblique appearance to the shell. The *S. deformis*, which occurs commonly in moist situations under old rubbish and rotting vegetable matter, has a diameter about equal to that of a common shirt-button. In the young stages, the shells are nearly discoidal and hyaline, being then superficially very similar to specimens of *Hyalina*; but with the growth of the whorls, the sub-globose condition is reached, and the axis becomes slightly perforated, and the lip thickened.

In the Lemon-snails (*Bulimus*) the shells are oblong or turreted, with the margins of the aperture unequal. In Brazil, the large species are eaten, and are said to be sold commonly in the market at Rio. The largest of the Guiana species, *B. oblongus*, is about 4 inches in length, with the peristome thickened and red. No doubt it would make a very palatable food. It occurs plentifully on the savannahs of the interior, in the neighbourhood of ponds and streams. What its food may be, in its wild condi-

tion, I am utterly unable to say, but when kept in confinement, they are particularly fond of the succulent leaves of the different species of lily-like plants. Its eggs are about the size of those of the pigeon, with a hard, granulated, glistening surface, and they are frequently mistaken for birds' eggs. It appears to be identical with the *B. hæmastoma* of SCHOMBURGK'S list. In *B. fraterculus*, the shell is small and thin, less than an inch in length, of a brownish colour, and with a thin lip. It is found in moist places, as in the case of *Streptaxis*. The prettiest of these shells is the *B. bensoni*, in which the length is about $1\frac{1}{2}$ –2 inches, regularly turreted, and having the whorls marked with faint purple-brown blotches along the line of growth, and with irregular bands in the direction of the sutures.

Most widely distributed throughout the colony, under every variety of objects in moist situations, are to be found the minute elongated, turreted, and many-whorled shells of *Stenogyra octona*. The apex of the shell is rounded and frequently truncated, and the aperture thin and rounded. The whorls increase considerably in size with growth, and the last or body-whorl is, comparatively, much enlarged. In the *S. beckiana*, the apex of the shell is pointed, the whorls are very narrow and equi-sized, the body-whorl being scarcely or not at all enlarged. The *S. goodalli* is excessively minute and few-whorled. This last species has been introduced into English and European hot-houses from the New World, and it is now almost a common English form.

In situations where the small species above described occur, will sometimes be found the glistening shells of *Physa* and *Hyalina*—the latter discoidal, and the former

with a large elongated body-whorl and a minute spire. With these also a small pale and rather thick shell, in size and shape very much like *Bulinus fraterculus*, will occasionally be noticed. This shell is *Leptinaria lamellata*, and may be recognised by the raised or expanded inner or columella lip.

The two species of slugs are commonly distributed and are rather plentiful. They may easily be obtained along the upper part of the central avenue of the Botanic Gardens, in the early morning—the larger of the two species being sometimes found feeding on the fallen flowers of the Oronoque trees (*Erythrina glauca*). In the one (*Vaginula occidentalis*), the body reaches a length of from two to three inches and is covered throughout by a brownish green, or dark and nearly black, coriaceous mantle, entirely destitute of a shell; in the other (*Parmacella sp.*) which is much smaller, a shield-like external shell is placed over the raised hump-like middle of the body. The shell is thin, oblong and slightly concave below and destitute of any spire, the edges of the shell being more or less covered by the mantle; the walking disk or foot is large and pointed behind; the generative pore is situated on the right, below the large oculiferous tentacle; and the anal is posterior to the respiratory pore, both being situated toward the middle of the edge of the mantle on the right side. The body is hyaline, but marked along the back with two wide and dark longitudinal bands, and with a variable number of longitudinally placed lateral spots.


The Bivalves in the list are all species of the river-mussels; and have been found along the higher Essequibo in the sand pools among the rocks of the rapids, and in the

pools of the savannah streams. The *Anodonta ensiformis* is easily recognised by its thin and narrow but very elongated shell. In *Hyria schomburgkiana*, the shell is somewhat cockle-shaped, swollen and very strongly ribbed.

The species of *Paxyodon* is a very interesting one, growing to a very large size, and attaining a width and length of more than eight inches. The valves become very thick with age, and are often extensively eroded on the exterior, especially in the region of the hinge so as to lay bare the beautiful nacreous substance beneath. As the British and Chinese river-pearls are obtained from closely allied forms, it is likely that the native forms are similarly productive, or, at least, may be made productive when treated on the Chinese plan of introducing into the living animal, shot, josses etc., between the mantle and the valves, where they become covered by the pearly substance which is continually being secreted by the mantle to form the shell.

Jamaica Proverbial Philosophy.

By the Rev. D. F. Reynolds.

ROVERBS from very early times have been characteristic of man the wide world over. Men of all climes and countries display a strong predilection for expressing themselves in proverbs. The savage as well as the man of culture illustrate in this, as in some other indications of their common humanity, the fact that: "a touch of nature makes the whole world kin."

Proverbs are to be found in sacred as well as in profane history.

Holy Scripture as we know has honoured the proverbial form of speech, in that some of the wisest and weightiest lessons of morality and religion are delivered in the form of proverbs; Our Saviour himself not disdaining their use when it suited His holy purpose so to do. They abound in every language, and from the days of ARISTOTLE, who was the first collector of them, until now, they have not been deemed unworthy the attention of some of the greatest intellects.

SHAKESPEARE makes frequent use of them in his immortal plays, a special instance occurring in "Coriolanus," Act I., Scene I.

Hang 'em !

They said they were an hungry ; sigh'd forth proverbs ;
That hunger broke stone walls, that dogs must eat,
That meat was made for mouths, that the Gods sent not
Corn for rich men only :—With these shreds
They vented their complainings.

JAMES HOWELL, who made a collection of them in the seventeenth century, thus sings of them :—

“ The people’s voice the voice of God we call,
And what are proverbs but the people’s voice,
Coined first, and current made by common choice
Then sure they must have weight and truth withal.”

Lord BACON speaks of them as being strong evidence of national life and character. “ The genius, wit and spirit of a nation,” says he, “ are discovered in its proverbs.”

Lord JOHN RUSSELL defines a proverb as being “ the wisdom of many and the wit of one.”

TENNYSON sings of proverbs as

“ Jewels five words long
Which on the stretched forefinger of all time
Sparkle forever.”

Archbishop TRENCH, one of the most celebrated theologians of the Irish Church, largely studied and lectured upon the subject of proverbs, and speaking of them he says :—“ What a body of popular good sense
“ and feeling is contained in the better, which is also the
“ more numerous portion of them, what a sense of
“ natural equity, what spirit of kindness breathes out
“ from many of them, what prudent rules for the manage-
“ ment of life, what shrewd wisdom, which, though not
“ often *of* this world is most truly *for* it, what frugality,
“ what patience, what perseverance, what manly inde-
“ pendence are continually inculcated by them, what a
“ fine knowledge of the human heart do many of them
“ display, what useful and not always obvious hints do
“ they offer on many most important points ; as on the
“ choice of companions, the bringing up of children, the
“ bearing of prosperity and adversity, the restraint of all

"immoderate expectations. And they take," continues the good Archbishop, "a yet higher range than this; they have their ethics, their theology, their views of man in his highest relations of all, as man with his fellow man, and man with his Maker. Be these views," says he, "always correct or not, and I should be very far from affirming that they always are so, the student of humanity, he who because he is a man, counts nothing human to be alien to him, can never without wilfully foregoing an important document and one which would have helped him in his studies, altogether neglect or pass them by."

This is just our standpoint in relation to our Jamaica Proverbs, and it is because we thus regard them that we have made it our business and our pleasure too, to collect and study them for many years past.

The result of that study has been the conviction, that there is no country which can boast of a collection of secular proverbs more pithy and instructive, more replete with wit and humour, or more terse and compact, than those which are associated with our beautiful "Isle of Springs."

From our collection we now submit a selection of some of the most striking and piquant, giving generally their English equivalents, and in a few cases equivalents in other countries, from which it will be seen they are not inferior in all those essential features which go to make a good proverb, to those with which they are compared.

1. When snake bite you ; you see lizard, you run.

The burnt child dreads the fire.

2. Bowl go, calabash come, or Hand go, hand come.

One good turn deserves another.

3. Bush hab ears, and 'tump wear hat.
The hedges have eyes, and the ditches have ears.
4. John Crow (the carrion crow, vulture) tink him picney white.
Blood is thicker than water.
5. Cuss John Crow "peel head" and turkey pee pee bex.
Offend one monk, and the lappets of all cowls will flutter as far as Rome. (Spanish.)
6. Calabash don't grow 'pon pumpkin vine.
As you sow, so you reap.
7. Cow tail cut off, God A'mighty brush fly for her.
GOD tempers the wind to the shorn lamb.
8. Kitchen dresser fall down, mauger daag (dog) laugh.
It's an ill wind that blows nobody good. (Scotch.)
9. Too much ratta nebber dig good hole.
Too many cooks spoil the soup.
10. When you go da tumpa foot dance, you must dance tumpa foot.
When you go to Rome, you must do as the Romans do.
11. Quattie (the smallest Jamaica silver coin of the value of $1\frac{1}{2}$ d. now out of circulation) buy trouble, hundred pound can't pay for it.
Mischief comes by the pound, but goes away by the ounce.
12. Hang your bunkra (basket) where you can reach it.
Cut your coat according to your cloth.
13. Play wid puppy, puppy lick you mout.
Too much familiarity breeds contempt.
14. Puss gone, ratta tek house.
When the cat's away the mice will play.
15. Cotton tree (the gigantic ceiba) ebber so big, little axe will cut him down.

Little strokes fell great oaks.

16. Pot laugh after kettle, say him black.

The pan says to the kettle, "keep off you will smutch me." (Italian.)

The raven cried to the crow, "avaunt Blackamoor." (Spanish.)

One ass calls another ass long ears. (German.)

17. Half-a-mout tell you him no yerrie, whole-a-mout tell you it too late.

They said to the camel bird (the ostrich) "carry," it said: I cannot, for I am a bird; they said: "fly," it answered: I cannot, for I am a camel. (Asiatic.)

The following are descriptive of certain unlovely aspects of human life and character!—

Selfishness—Daag (dog) drink water, "for you for you."

Envy—Man da eat good, ugly da watch him.

Scheming men plotting—'Ceitful fire roast plantain, cuncassa (soft soap) scrape it.

Youth mocking at Age—Man no done grow musn't laugh after long man.

A man who is so afraid of another man that he cannot say his soul is his own—Cow belongs to butcher, can nebber say, "I berry well."

Ingratitude—You sorry for mauger dog, him turn round and bite you.

An intermeddler who has got into trouble—Dog lib well, him go trouble cow a pass (in the road), cow kick him.

A boaster in a fix—Trubble ketch bull-dog, monkey breeches fit him.

A hypocrite—If you no hab yeye water when you go da berrin, begin cry soon.

The following we give without note or comment, as to do so would prolong our article to an unreasonable length, only remarking that the wit and humour which sparkle from them can only be fully appreciated by those who are acquainted with the idiom of the "old time negroes" of the West Indies.

Bad fambly better dan empty pig sty.

When man say him no mind, *a den him mind.*

Man no know him no know.

Nebber mek goat trustee for bread-fruit-tree.

Behind dog, it is dog; before dog, it is Mr. dog.

Hungry mek monkey blow fire.

Play wid monkey, but no play wid him tail.

Lazy man nebber nyam (eat) green corn.

Monkey gib him dog name, say:—"Sit-down-look-tay-bam-bye-we all-wi-see."

De same knife kill goat, will kill sheep.

Dog hab too much owner, him sleep widout him supper.

Any way you cut dog tail it will fit him.

Finger nebber say "look here," but always say "look yonder."

Poor man say: "hold ya nek me cut"; rich man say: "put de whole dà pot."

Man lib well, him tell cow, how-dye.

Married hab teet, and him bite hot.

Pocket full and basket full, 'ooman laugh.

Hansome face 'ooman not the bestest kind of 'ooman.

Hungry fowl wake soon,

Mean man go to market two time.

One tief nebber like fe see anodder tief carry a long bag.

Shut mout nebber ketch fly.

When yeye (eye) meet yeye, man 'fraid.

Man no dun cross ribber musn't cuss alligator, "long mout."

If fish come from ribber bottom tell you alligator hab teet-ache, believe him.

Rain nebber fall a one man door.

No tek narra somarri yeye so sleep.

Tiger old, dog bark after him.

Hen da cattle and da 'joyment himself, him no know say hawk da watch him.

Man hate you, him gib you basket for carry water, but if you clebber you will put plantain leaf in dey.

Lie worse dan sore.

Dog say, sooner dan pay sixpence for trousers, him will pay doubloon (a Spanish golden coin of value £3 4s. 6d.) for bone.

Dog massa gib him money for buy bench, dog tek it, buy bone, and say, Big Massa (the Creator) nebber ben mek him for sit down 'pon bench.

Fowl nebber lick him own chicken too hot.

Horse no business da cow play.

Cow horn nebber too hebby for cow head.

If *foot* miss pass, him can find it, but if *mout* miss pass, him no can find it.

Shoes one know say 'tocking hab hole.

When you hab berrin' you no pick and choose you grabe-digger.

Braggin' ribber nebber drown anybody.

Sit down nebber tell him Massa "get up."

Big word nebber crack man jaw-bone.

Ole fire-stick soon ketch.

If you want for eat old 'ooman pepper-pot, tek time
'cratch him back.

Cockroach mek dance him nebber ax fowl.

Cockroach ebber so drunk him nebber walk into fowl
yard.

Flea say him redda (rather) a man wid him two eye fe
ketch him dan a blind man fe hold him.

Driber nebber 'fraid fe long whip.

Cow ded lef trouble gib cow-kin.

Rock-a-tone a ribber bottom, no know say sun hot ; or
Rock-a-tone a ribber bottom, no know wha Rock-a-tone
a road da feel.

Ebery day debbil help tief, one day Big Massa (the
Creator) will help watchman.

Go a heaben no boy.

If you tan a market long, you will owe debt.

Duppy (ghost) know who fe frighten.

A pound ob fretment won't pay a gill ob debtment.

Hab money hab fren.

" Yerrie say," can't go to law.

Greedy choke puppy.

A no because cow no hab tongue mek him don't talk.

A no parrot one nyam plantain but because him *mek*
noise dem say a him one.

Nyam some, lef some memba to-morrow.

Ebery ting good fe eat, but no ebery ting good fe talk.

Patience man ride jackass.

Dog a run fe him character, but hog a run for him life.

When black man tief, him tief " Quattie" (1½d.), but
when Buckra tief, him tief whole a estate.

When fowl drink water, him lift up him hed say " tank
God, tank God ;" when man drink water, him say nothing.

Let any one who is at all acquainted with West Indian negro life and character as it existed in Jamaica half a century ago, examine these old time sayings and he will find in them a depth of thought, a power of imagination, and a brilliancy of wit, which at once places the Son of Africa in a position to ask his more intelligent, simply because more favourably situated fellows, "Am I not a man and brother?"

"Children we are all

Of one Great Father, in whatever clime,
His providence hath cast the seed of life,
All tongues, all colours ; neither after death
Shall we be sorted into languages
And tints,—white, black and tawny, Greek and Goth,
Northmen and offspring of hot Africa;
The Allseeing Father—He in whom we live and move,
He, the impartial Judge of all, regards
Nations, and hues, and dialects alike.
According to their works shall they be judged,
When evenhanded justice in the scale
Their good and evil weighs."

Our Railroad Age; or, South American Development.

By T. P. Porter.



HE practically isolated position of the Guianas, hemmed in as they are by the impenetrable and unexplored wildernesses that stretch away westward to the Cordilleras and southward to the Amazon, effectually separates those European colonies from the great and progressive centres of civilisation of this continent. It is therefore not to be wondered at that in the British, French and Dutch Colonies, sympathy in the progress and development of the neighbouring States is at zero. Even the geography of the continent is taught in a very cursory sort of manner here, and whilst it is probable that any of the school pupils know equally well that the Amazon is the largest river in the world and the Danube is the greatest in Europe, it is a question whether they could rattle off the boundaries and name the capitals of the South American Republics, as easily as they could those of the Balkan States. And how many people in British Guiana, whether school children or adults, are aware that with the exception of the cataracts and a single land portage of two hours, there is a free water communication between the Essequibo River and Para on the Brazilian Coast, Angostura in Venezuela, and innumerable interior ports of Brazil and Peru? At present this communication is valueless, not only because the Guianas have no interest in or connection with their neighbours, but also because

it traverses what has above been designated as a wilderness—prodigious primeval forests that are practically a *terra incognita* to civilisation. Still, the general ignorance of its very existence indicates how very little is really known of the possibilities of this Continent, even by those who reside in their very midst.

The time is now approaching, however, when this ignorance of and indifference to the neighbouring States will be greatly modified; and when, indeed, it may be found of vital importance to the commercial and industrial interests of the Guianese to open up communication by railroad with their Latin neighbours—either to the West or South; as the case may be. And as that time is within measurable distance, a description of the vast South American railroad system now being projected may not be found out of place in the pages of this journal. As will probably be known to many readers of this article, several lines of railroad have already been constructed in Brazil, the Argentine, Chile and Peru, whilst a great many more are in process of construction. Already the line from Buenos Ayres to Valparaiso is nearly through, the last, the trans-Andean section, being within two years of completion. Throughout the Argentine and Peru there is a perfect network of lines in course of construction, and which, in the case of the latter country, owing to the fortunate settlement of the foreign debt and the concessions given the bondholders, will be continued on to the Purus and Amazon rivers, Lake Titicaca and La Paz, and other Bolivian cities. Meanwhile, the northern branch of the Argentine road is being steadily pushed forward to the Bolivian frontier, whilst in Bolivia arrangements are being made to con-

struct a line from La Paz to meet the Argentine line on the frontier. Again, a project is under discussion to extend the Rio Janeiro line, under international concessions, right on to the north-west, through Bolivia and into the heart of Peru. There are several other lines, but being more strictly local these call for no particular mention here, and we may therefore now proceed to the consideration of another and yet greater project that is being floated in the United States, and which is destined to link together, as with one continuous chain, all the countries of the New World, from Ottawa to Buenos Ayres and from San Francisco to Victoria in Chile, thus bringing New York within twelve days of Valparaíso.

The Colombia Railway Company, with a capital of \$100,000,000, proposes, as the prospectus expresses it, to construct a railroad "to skirt the Andes; cross the Pampas, and connect generally with everywhere"—in South America, of course. The Company as organised includes the establishment of steamship lines to ply between the North and South American termini until such time as the present Mexican lines shall have been connected with those of Central America, thus completing the last link of the chain between the North and the South. The Northern South American terminus of this gigantic road will be at Carthagena, on the Caribbean Coast of Colombia. Thence the line will go south, skirting the eastern flank of the Andes and the head waters of the Amazon, to points in Peruvian and Argentine territory, where it will connect with the railroad systems of those countries described above, as either now in operation or in course of construction. The steamers of this line will con-

nect Cartagena with the Florida and New Orleans termini, but when the Central American road is completed, the ferry will only be across the mouth of the Bay of Panama, from Azuero in Panama to Cupica bay in Antioquia, 135 miles, whence a special branch railroad will convey passengers and freight to the central line. A distinguished and enterprising American railroad man, Captain H. C. PARSONS, is the originator and controlling spirit of this greatest railroading project ever undertaken, and he has spent upon it fifteen years of study and a considerable amount of money in travelling, investigating, examining surveys, and collecting all information generally, and he has now been at last enabled to demonstrate to the satisfaction of capitalists its feasibility. The only part of the proposed route that remains absolutely unknown is that region lying between the sources of the Magdalena and Napa rivers, over the dividing ridge of the Cordilleras in Ecuador, and which is about one hundred miles in extent, and there the only real difficulties will be met with. A chain of mountains will certainly have to be crossed, of the formation of which nothing is known, savage tribes having hitherto rendered all efforts at exploration abortive. The explorations and surveys will therefore have to be made under an armed escort, but there can be no doubt that the savages will soon yield to the inevitable advancement of civilisation. As regards all the rest of the route, the official *data* collected by Captain PARSONS at the expense of so much time and capital, go to show that the obstacles to be encountered are far less than those overcome in the construction of the Canadian Pacific and the Denver and Grande lines in North America. The estimated length

of the main line is 2,000 miles, one half of which distance will skirt streams, navigable for moderately sized steamers, that are tributary to the great water-ways of the South American Continent. At Cuzco and Cerro de Pasco a junction will be effected with the two Peruvian lines from the seaports of Molendo and Callao, whilst at the former point will be met, the railroad from Buenos Ayres on the Atlantic.

Vast, and it might almost be said inconceivable, are the commercial and industrial possibilities that will be developed by the construction of the lines mentioned. Lima will be brought within nine days of New York and sixteen of London, and Valparaiso will be in thirty hours distance of Lima. This will of course revolutionise the commercial interests of the South American States, but unquestionably the greater impulse will be given to their industries, that now lie practically dormant. Not to dwell too long upon this aspect of the development to be effected, let it suffice to state that at Cuzco and Cerro de Pasco the heart of the mineral region will be reached, and that at the latter place there lie *uncovered*, ridges of silver ore estimated to produce 42,000 tons of pure silver, for which no means of transportation to smelting works are now available! And this gives us but a passing glimpse of the mineral wealth of the regions that will be opened up. The agricultural possibilities of the soil of South America are too well-known to call for comment.

All this, however, affects the Guianas but remotely. The immediate development of the neighbouring Latin Republics will probably have no more influence on their commerce and industry than the similar development that

is going on in Central Asia. The time will come, however, when the establishment of railroads throughout the Republics of Venezuela and Colombia, and which will connect with the great central line, will indicate the desirability of a Guiana line to connect with the Venezuelan system, thus placing British Guiana within reach of the benefits of the great railroad system of the continent of which she forms an integral portion. She is a growing colony, with almost unlimited room for expansion, and her commerce and industries will not always be so restricted as they are at the present time. And in the days of rapid transit that are coming swiftly and surely upon the world, it will not do to be behind hand and dependent upon ocean transit wholly, whilst countries thousands of miles farther from Europe and the United States than we are, will be brought by rail within two-thirds nearer, by time, than we will be of those centres of civilisation. These facts should be an incentive to the pushing forward of local railroads toward the west, even into the very penetralia of the vast wilderness that lies between the Essequibo and the proposed Central line of the South American railroad system. Besides, as is well-known, the railroad is the pioneer of civilisation. Colonisation follows the railroad into the wilderness, it never precedes it, properly speaking,—at least not in that systematic manner that can alone guarantee permanent development. For the actual progress and prosperity of the country in the immediate future, therefore, as well as to enable her to keep pace with her neighbours in times that are comparatively more remote although practically not more than a generation ahead of us, if so far, it is fast becoming an imperative necessity

for those responsible to bestir themselves in the matter of constructing railroads throughout the colony. Nor need these necessarily be a charge on the finances of the country. In Spanish America syndicates of foreign capitalists gladly avail themselves of "concessions," in return for which, together with a moderate guaranteed per centage of interest on the capital invested, they undertake to run railroads right through forests, over rivers and round or through mountains. Under such a Government as that of British Guiana, and in view of the possibilities of the country's latent industries, how gladly would not English and American capitalists respond to any overtures that included concessions and privileges similar to those offered by our Latin neighbours, but the insecurity of whose "guarantees" is not amongst the minor drawbacks to the investment of capital that have to be considered. It is about time to be up and doing, and those who have the interests of this magnificent country really at heart will surely look forward with eagerness for the first movements in the direction indicated in the foregoing pages.

Jottings from the British Guiana Gold Diggings.

By E. G. Fraser Luckie.



WORK in the British Guiana Gold Bush affords an excellent opportunity for observing the manner of all the people engaged in the gold industry. To begin with, all concerned must live in common, and frequently a stranger can hardly distinguish the manager of a placer from the labourers. This community of living allows us to see much more of the habits of those engaged in the work than is possible in the comparatively civilised portions of British Guiana where artificial boundaries and distinctions of classes exist. In many respects, speaking of gold diggers as a class, we may use the words of the proverbial midshipman : " Customs beastly, manners none ;" but in one respect, as regards personal cleanliness, they set an excellent example. As a rule, they wash whenever possible, and when a dirty member falls among clean ones, I have known him to be held down after the day's work and vigorously scrubbed over with the brush used to clean down the sluice or tom. This treatment generally convinces such an one that cleanliness is indeed next to godliness, and he acts accordingly.

In describing the habits of our subjects, we begin at the head and commence with the most curious of head-men, the " pyjama manager." He carefully avoids over-exertion, and indeed, exertion of any sort, when travelling up the rivers. He generally requires an umbrella to protect his complexion from the sun. He is afflicted

with various extraordinary and complicated diseases. Of these managers there are two classes. The first kind frequents the waterside camp, and this for obvious reasons. The way to the back or gold placer proper is a steep, muddy and difficult road to travel. It generally occurs to these intelligent men that as personally they were never intended for hard work, it will be an economy to the capitalist for them to remain at the waterside camp and keep the stores under their own eyes, thus saving any waste, the expense of a watchman and the cost of transporting their own food and clothing to the placer. This class of man is known as the waterside prospector.

The manager of the second class generally reaches the back camp some time after arriving at the waterside, and incontinently takes to his hammock to rest him after his labours. After that, an occasional turn round the place suffices. His time is divided between his draught board and working out petty spites against offending labourers. When he does go his rounds, he insists on being called "Manager," and occasionally he will exhibit his personal strength and prowess in an awkward struggle with some tool or other, surrounded by the admiring gang in a delightful state of inactivity. The "pyjama managers," of whom fortunately there is not a large proportion, are thoroughly satisfied with their achievements, and convinced that all their duty consists in finding gold, irrespective of cost. Under such circumstances it is really surprising that labourers work as well as they often do, and the only possible explanation is that frequently, as the men well know, it is: no gold, no money. Happily for those providing the funds for these expeditions,

there are many men, and I am bound to say as often black as white, who faithfully try to carry on the work entrusted to them, and do not shirk their share of it. Of course a certain amount of gold is stolen and generally by the manager himself, but this is kept within bounds by the necessity for clearing expenses or clearing out. Most placers find employment for a clerk whose day's work can generally be done in half an hour, unless, as I once saw, the manager can induce the man to cook, and then I suppose he may be said to work for his living.

We come now to the sinews of the camp, the labourer. He is never so happy as when he is grumbling, and that he is always ready to do. In the morning, the clock is fast; at night he accuses you of shifting the hands and declares that it is slow. He frequently assures you that he is devoted to your service. All he needs is a little encouragement, liberally interpreted, "grog." He is continually assuring you that if you can treat him well, that is, give him more than his allowance of food, he will indeed work for you. He abounds in honied words, commonly known as "sweet mouth" or "rattle," and at such times, beware! he is fooling you.

These remarks are intended to apply only to the creole labourer, who, after all, is the only one suited to this work. As to the others, the coolie and "Bill" are too liable to sickness, and the Chinaman is too smart. "country," i.e., the Barbadian, is too delicate, and the Portuguese and Mulatto population are physically unable to do the work. Above all, in engaging labourers, beware of the "boots man!" On no consideration engage a man who seems at home in his boots, and,

generally, look for the barefoot man. "Bill" generally gives out before his time is done. He takes his advance to his uncle, and comes into the bush utterly unprovided with clothing—sometimes without even a hammock. He has to subsist on food entirely different from that to which he has been accustomed, and the poor feeding alone renders him an easy prey to malaria and dysentery.

It is about his food that the ordinary labourer is most troublesome. He is perfectly aware of the amount of his allowance, and never wearies of telling you that he knows that, though you personally have nothing to do with it, the cook is robbing him. When told that under the circumstances it will be advisable to take his raw victuals and cook them, he will find numberless objections to such a course. Many make a regular practice of begging, giving one the disagreeable necessity of refusing. These few drawbacks, excepted, they are a happy lot, and generally work very well.

At night when their work is done, and particularly when there is a large gang, song after song is sung, and the chorus taken up in perfect harmony and unison. Certainly the songs are frequently mere repetitions and very meaningless, but in the still nights the singing is far from unpleasant, and appears to afford the performers infinite delight. The variety of the instruments is marvellous. Besides concertinas, flageolets, violins, guitars, etc., which they bring with them from town, they invent many more. They will rattle a spoon on a pudding pan very musically, they make use of the familiar comb and piece of thin paper, they whistle very fairly, they construct flutes with old bones, violins with meat cans, and wonderful to relate, they make even violoncellos.

This last instrument is so remarkable that it deserves a separate description. A piece of strong, pliable wood, about three feet long, is bent into a half circle by means of a piece of stout whip-cord. An ordinary fiddle bow is made with wood and thread, and both the thread and whip-cord are thoroughly waxed with a little of the soft sealing wax off the top of a gin flask. An empty paraffin can is next obtained, to be used as a sounding board. The performer sits holding the bent wood, one end resting on his left shoulder, and one on the paraffin tin, bracing the whole and holding it in position with his left leg. The bow is held in the right hand, and by drawing it across the whip-cord, a good, well-toned sound is obtained, very similar to the note of a violoncello. The notes are obtained by holding the whip-cord between the first finger and thumb of the left hand, fingering up and down the single string. With this primitive instrument, really wonderful results can be obtained, and to hear the men playing it on Sundays to accompany their hymns, quite reminds one of church. Its resonance is indeed remarkable.

On the river they like to sing to the time of the oars or paddles, and, when possible, to rattle their hoes and spades, in time to some popular tune when working at the tom. If there is any hauling to be done, they are delighted with the opportunity for clearing their throats. They are also very fond of dancing. On moonlight nights they dance the "tobo" or the "kumfo." Give them a clear space, no matter how rough, and soon it will be level and smooth. They seem to be utterly regardless of the soles of their feet, the skin of which, from continuous exposure and long use, becomes as thick

and hard, comparatively, as boot sole. When dancing, they will stamp with their feet and the noise can be heard at a great distance.

On Sundays, religion holds its sway. Service is held twice a day. One or more of the men take in the "War Cry" regularly, and racy extracts from that humorous publication together with the meals, fill up the intervals. The most energetic pay calls at the neighbouring placers. Gold diggers, as a rule, are very religious. They invariably say, "God willing," or "by God's help," in reply to an order. When called upon to turn out in the morning, they are generally in the midst of some very lengthy morning prayers. If you catch a thief, the morality with which his "matties" will cry shame upon him, is very instructive—but as you will generally catch a large proportion of them in some dishonest act before you have done with them, it can hardly be edifying. I have heard them say: "Thou shalt not steal, but take a little to help thyself." Their motto seems to be "beg, borrow, or steal"; although it is only when they cannot steal, that they will condescend to beg or borrow. They are extremely superstitious, and their tales of the supernatural are only equalled by their nancy stories, jokes and parables. All of these are surprising in their way, but they must be heard to be appreciated.

At this present moment, on the placer where I am stopping, we can boast of a ghost, and a phantom tom. One day when cutting posts, a man discovered a grave on the side of a hill. Since then, the ghost experiences come fast and furious. Frequently at night, the tom is heard working! Nobody, under any consideration can be induced to go alone on the "grave hill." The

man who found it, dropped his tools and ran, and it took three men to fetch them away. One day, crossing the creek on a fallen tree, I had the misfortune to slip in, and five independent and reliable witnesses came forward and stated that they saw "that worthless fellow," meaning the ghost, deliberately "shove me in." When there has been a bad day's work, I am frequently told by the men that they saw the ghost watching them, "in his flannel and sliders."

One thing is very noticeable and satisfactory with the men; they are always glad when they find gold, although it is not for themselves. They seem to take an interest in their work, and in my opinion they work very hard for their money, which, when they get it, they squander recklessly. Occasionally a hammock man enters on the scene, and he is best got rid of before he spoils good hands. It is always easy to make things warm for a lazy man, so that he is glad to go before worse befall him. I know a manager who wishing to get rid of such a man, put him to dig "a task" on the top of a hill. Now "a task" is a portion of work to be completed in a day, and for which one day's pay will be given, whatever time it may take to finish. Its dimensions are seven feet square, to dig until "pay dirt" is found. After digging fruitlessly for several days, our poor friend said to the manager: "Mr. S., I'm digging and digging and can't get the gravel, sir." He replied: "Bo-oy, dig no! Am is dere de Mama dere." After that the boy dug again for some days and then said: "I can't catch the gravel, sir, the place is too deep." The reply came back: "I know it's deep. That's why I put you there. Am is dere de Mama dere." After a time the boy gave

the thing up as a bad job. To all his representations Mr. S, would only say : "Bo-oy, you better shake you shirt-tail and do de buckra work." After a time the young man made up his mind to clear out, else he might possibly have been there still.

Frequently men come into the bush sick, and such are an expense to their employers. It is a pity that a medical examination could not be added to the system of registering the men now existing. It would save the greater part of the present number of deaths in the bush. I believe that a medical pamphlet on those ailments most frequent in the bush would be much appreciated by those working there.

There is no doubt that the present Ordinance is keeping back the gold industry. Let licences be given to purchase raw gold on the spot where it is found, and stores and farms will rapidly be established there. Let the registration of labourers be made optional, and they will be engaged and paid weekly, or daily, on the spot itself. A great economy of labour will thus be effected, and the laws of demand and supply will regulate its price. The country would be opened up. We should no longer hear of boat-loads of stuff being transported up and down the river, of placers giving out and causing a loss on unemployed labour, and of labourers starving in the bush and sometimes returning to town after a four months' trip to find they cannot get their money. The system of advances would probably be done away with, and the industry largely developed. We live in hopes. Give us a new Ordinance is the cry of the gold-diggers ! Who will hear us ?

Defecation of Cane Juice by Electricity.

By Seaforth M. Bellairs.



It is now a good many years since the influence of electricity on cane juice, first became the subject of consideration.

At present, it is somewhat of a sore subject, owing to the shameful swindle of a Company, that pretended to have discovered a method of refining raw sugar into pure sugar, dry, and in one operation, by the supposed influence of electricity. But, because unprincipled adventurers have used the term electricity to cover a swindle, it by no means necessarily follows that there may not be something in the action of electricity, which may prove useful to the sugar maker.

By the term "Sugar Maker," I mean more the maker of sugar than the refiner. The two are not at all the same thing. The sugar maker takes the juice of a plant, generally cane or beet, and extracts therefrom one of its constituents, sugar. The refiner takes raw sugar and separates the sugar from other substances, which we may call impurities, which are mixed with it, rather than in it.

For instance, yellow sugar, such as Demerara usually exports to England, is really white pure sugar, each crystal of which is covered with a very thin film of a sticky colouring substance; and dark sugar, shipped to the United States, is much the same except that the sticky substance is dark and dirty-looking; there are some particles of dark matter, incorporated inside some of the

crystals, but they are shut in more as a fly is sometimes found in amber, than incorporated as copper is in brass.

Therefore the separation of impurities in commercial sugar is not the same process as the separation of sugar from the other constituents of the juice of a plant. And what may answer in the one case need not necessarily be a success in the other.

Let us consider what the sugar maker here has to deal with. It is the stalk of a plant, the sugar cane. If a transverse section of this stalk be made, it will be seen that it is divided into two parts; the circumference and the inside. The circumference is a rind, the juice of which is sap which rises to nourish the plant. This sap consists of substances useful to the plant, that would eventually be converted into sugar by nature's chemistry, but they contain no sugar yet. The inside is a quantity of cells made of woody stuff and filled with a clear limpid liquor, which chiefly consists of water and sugar. The spaces between the joints are a mass of cells. At each joint is an eye and a circle of spots. These eyes are the germs of future shoots, and these spots are the germs of future roots, and these are fit for growth, unless, as in ripe canes, they are dried and withered by age.

In fact, the internal economy of the cane reminds one of the arrangement of a honey-bee's hive: the cells of the cane remind one of the combs containing bee-food, while the joints are somewhat similar to the combs containing eggs and larvæ.

The middle of a cane is the sweetest, because it contains the largest proportion of centre cells; and the upper end is the poorest, because it has a large proportion of

sap and a small proportion of "cane juice." As the sap is in the exterior, it is advisable to have canes of the greatest possible diameter, so as to have the sap in the least possible proportion to the juice. Provided always that the cane be full-grown and mature, or ripe.

It is easy to prove that canes are divided into parts with different functions. Take two half-grown canes; in one case, scrape off all the rind, and the head will die. In the other, open the cane and cut out all the inside cells leaving only the rind, and the cane will continue growing as though uninjured. In fact, canes are constantly seen in full growth connected to the root by only a narrow strip of rind.

Canes are brought to the factory and there either crushed in a mill, or sliced up and diffused.

Advocates of diffusion claim that, by that method, the greater portion of the *sap* remains in the chips; while the sugar from the cells passes out dissolved in the water. This may be so, but the liquid obtained by either method is by no means a mixture of water and sugar, exclusive of other substances; there is always a large proportion of sap, and the contents of the cells themselves are not pure sugar and water, but contain other vegetable substances.

In the liquid flowing from the mills, is contained all the sap both from the rind and from any cane leaves that may be mixed with the canes.

The problem is, how to separate all the constituents of this liquid obtained from the cane; to retain the water and sugar, and get rid of all the other substances. When this is done, the water is easily evaporated, leaving only the sugar.

The present method is the addition of an alkali, generally a solution of caustic lime. This, coupled with heat, coagulates the greater portion of the sap, which subsides; most of what remains, on the further application of heat to boiling point, rises to the surface and is removed in the shape of scum.

The result, however, is by no means the desideratum, a mixture of sugar and water; it contains a large proportion of glucose and also some soluble salts of lime. Right through the subsequent operation of evaporation, these salts are present, and it is to be presumed that they continue to do a deadly work and convert crystallizable into uncrystallizable sugar.

Doubtless the "sugar doctors" of the colony have succeeded in largely increasing the recovery of the sugar. This increase is chiefly due to the adoption of the modern method of evaporation at low temperature in vacuum. But the polariscope still shows an amount of sugar largely in excess of what is obtained, even when allowance is made for the deleterious action of the glucose which is revealed by the "copper test," and the natural salts found in the ash of the cane juice.

The question is, therefore, whether all or at least a great part of this separation could not be better effected by electricity, which could not add a foreign substance to the cane juice. Would not cane juice so defecated be more nearly the desideratum, viz., a mixture of sugar and water?

The first experiment in this direction, that I ever saw, was made at Plantation *Bel Air* many years ago. An attempt was made to filter cane juice through granules of two metals, such as iron and zinc, which were

supposed to set up a galvanic action. The result was a beautifully clear limpid liquid; but alas! on application of lime and heat this clear liquid was found to be subject to the usual coagulation, and its beauty was therefore due, chiefly, if not wholly, to the mechanical action of the filtration it had undergone.

Subsequently, Mr. GILL, since dead, devised an apparatus which was tried at Plantation *Hague*, and afterwards, in 1879, at Plantation *Caledonia*, Wakenaam.

This apparatus consisted of an oblong wooden box, which acted as a bath to a sort of galvanic battery, consisting of a square double box, each side of which formed a V. This box was made of zinc and the sides were smeared with a "patent composition" made, apparently, of a mixture of tallow, iron filings and some acid. The juice was supposed to enter into this zinc box and to percolate through sand under it, (it stood on four short legs,) and then to be filtered through diaphragms made of zinc, perforated in large holes, and covered with cloth.

This apparatus may have been a success in the laboratory but was far too slow for a factory. The sand and filters may, perhaps, have caught impurities, but they so impeded the flow of juice, that, in a very short time, the bath filled up; and the whole arrangement disappeared in a sea of cane juice, and then everything came to a stop till the apparatus was relieved.

Nevertheless, in spite of its defects, and notwithstanding that a large portion of the juice was very imperfectly, if at all, treated by the electricity, sugar was, on one occasion, made without the addition of any lime at all. And, what is even more significant, some of this cane juice, thus treated, was stored in the ordinary liquor vats

of the distillery, and this liquor showed no signs of the usual vinous fermentation, which, though undesirable from a distiller's point of view, shows that a radical change in the constituents of the juice had been effected. Unfortunately, the apparatus, with its sand and diaphragms, proved quite unworkable, and it was condemned; and I have heard no more of it.

The failure of this particular plan may have been due to details which could be altered. It seems a pity to let the question drop. If electricity will defecate cane juice, surely the method of the application need present no insuperable difficulties.

Mr. C. WILLIAMS, who watched the experiment with Mr. GILL'S process, wanted to see if similar juice, without lime, which had not been galvanized, would have crystallized. He thought that the partial success might have been due to an exceptional purity of cane juice at that particular time, and was not to be attributed to any electricity at all. Unfortunately, the experiment could not be tried, as the smallest pan on that estate was so large, that failure meant a serious monetary loss.

It seems strange that there is no experimental factory in the colony, a laboratory where experiments could be conducted on a commercial scale—large enough to see how new methods would work in the plantation factories, and yet so small that failure should not cost so very much. The expenses connected with a small factory, with a little pan, of half a ton or so capacity, would not be very great; and they might, by arrangement, be divided among all interested, namely, the proprietors of sugar plantations.

Experiments on a large scale, even when successful, are

very expensive. The careful weighings and measurements keep back the work; and all the time wages and consumption of fuel go on.

Attached to this small factory might be a miniature estate, of say 50 acres, laid out in plots, or fields, of an acre or so each. In these plots questions connected with agriculture, such as the best system of irrigation, the values of different manures, the advantages of different kinds of canes, and the possibility of obtaining fecundated cane seed, could be solved; and in the experimental factory, experiments could be conducted on such subjects as new styles of mills, diffusion, different systems of defecation, the action of various chemicals on the juice, methods of evaporation, best ways of hanging boilers &c., &c., besides all the questions connected with the distillery. These questions, which are of the very greatest importance to the welfare of our staple industry, could be solved at small cost. As it is, planters are groping more or less in the dark, deterred from settling many matters by experiments, owing to the great expense and risk attending them.

Rum.

By W. M. Miller.



S one of the commercial products of the colony, the subject of this paper is one concerning which but little has been written. It does not even form a topic of conversation amongst the planters. In reports on estate's work it may have a few lines devoted to it; but it is seldom that any genuine interest is taken in it, either in its manufacture or in its quality. The usual feeling is that the rum makes itself, and does not require any looking after. The molasses is diluted and the wash distilled; and if the results are low, the molasses is blamed; and if the rum is bad, the distiller gets a reminder.

But in these latter days there has been a brightening up of interest about rum. The Government meditate new legislation; and home buyers are becoming more fastidious owing to the quantities of continental root spirit, called "Rum," that are thrown on the English market. This latter reason soon affects the manager of the estate, and for some time there is continuous rubbing of hands and sniffing, with more or less satisfaction—generally less. The smelling business is not satisfactory, and to those more initiated the dilution with water seems uncertain. Altogether there is a general feeling that something is wanted, like a polariscope for sugar, that will give in a figure at once, whether the sample is good, bad, or indifferent. But the polariscope only serves

to pass or condemn non-chemical sugar, it, unfortunately, cannot gauge the price of a yellow sugar.

We have the misfortune to cater to a fancy of the most changeable type. So it is with rum. We have to suit an unknown personal taste, and, let us do our best, if we halve a sample, A. will laud it, while B. will probably call it "beastly stuff." But the chances are that B. does not know what a good rum is, as the sniffing test is still fashionable; and we come back again to the desirability of a "polariscope," wherein B's taste is the optical part that indicates "beastly stuff." In others words, if we had such ready chemical tests as could permanently record B's taste in some fixed way, we should be able to avoid shocking B., and at the same time to please A.

It is with the hope, therefore, that some universal method may be introduced, not only here but by the buyers also, so that every one's particular liking may be recorded in figures, that I have come forward with the following contribution to the subject. The "everybody" in this case is probably a few individuals in two or three markets.

Another reason that should demand the more systematic analysis of rum is the desire to guard our product from being imitated by the Continental spirit. Unless analyses of the genuine spirit be well known and widely circulated, analysts would find some difficulty in distinguishing the genuine from the imitation.

In no book or paper have I met with any analysis of rum. Writers content themselves with the mere mention that Rum is the spirit obtained from the fermentation of cane sugar molasses. BLYTH further

gives the usual strength, and that it is always slightly acid, about .5 per cent. (whatever that may be is doubtful), and that the solid residue varies from .7 to 1.5 per cent. and the ash seldom more than 0.1. ALLEN goes a little further and says: "The characteristic flavour of rum is due to the presence of ethyl butyrate and formate." He further gives the means by which some factitious rums are concocted, and then mentions that "the presence of formates *might perhaps* serve to distinguish genuine rum from a factitious product." Beyond the above, on rum proper, very little has been printed; but on the examination of spirits, mostly for impurities, there is scarcely any limit.

The examination of the rum should take place on the estate. Very little or nothing can be done after it has left the estate. But first I may be excused if I very briefly indicate some points that influence the rum while it is still in the fermentation vats.

The usual custom here is to allow the fermentation to proceed spontaneously, and if a return of 5 per cent. to 6 per cent. of 40 O.P. spirit be obtained from wash set up at 1060 the result is considered satisfactory. It may be interesting to calculate the highest possible that may be obtained, as the point is connected with the proposed legislation, which requires that for every 5 deg. of attenuation of the wash (water=1,000), three-fourths of one gallon of proof spirit shall be obtained. There is some uncertainty in the above requirements. Is it three-fourths of a gallon measured at 80 deg. F. of proof spirit that is required, or is it three-fourths of the standard gallon that only exists at 51 deg. F. and weighs 9.2366 lbs.? This is a matter, to the revenue at least,

that is of considerable importance, for the weight of the gallon of proof spirit that exists at 80 deg. F., weighs only 9.109 lbs. The difference in the definition between the gallon of water and the gallon of proof spirit is, that, in the case of water, it is that *volume* of water that weighs 10 lbs. at 62 deg. F., while in the case of spirit it is *the gallon* of spirit that at 51 deg. F. weighs 9.2366 lbs.

By direct experiment it has been found that on fermentation the following results are obtained:—

		100 parts Sucrose produce.	100 parts Glucose produce.
Alcohol ...	...	51.11	48.40
Carbonic Acid ...	...	49.42	46.60
Glycerine ...	...	3.16	3.30
Succinic Acid ...	...	0.67	0.61
Cellulose, fat, etc.	...	1.00	1.20

It will be noticed that 100 parts sucrose produce 105.36 in different bodies; as in the inversion of the cane sugar, water (or the elements of water) is assimilated, and the solution becomes denser.

If, therefore, a wash be set up with sugar at a density of 1060, the density will increase to 1063 before attenuation sets in. Which of these is the true "originate" density? If the first, then the 3 deg. extra cannot be claimed, nor its production of 0.47 gallon proof spirit per 100 gallons wash. And if the second, the question may arise, when is the density of the wash to be taken?

The same weight of sucrose or glucose will set wash at the same density, but the return in the first case will be much higher than in the second. To put it in popular terms, suppose two vats set up at 1060, A. with sucrose, and B. with glucose, and they both completely

ferment. The ultimate density of A. would be 986.8 while that of B. would be 987.4, and the return of A, per 5 deg. of attenuation would be 1.19 gallons of proof spirit (standard), and for B. 1.13, or a return of 17.45 per cent. proof spirit for A, and 16.74 per cent. for B.

This difference in the theoretical maximum is of importance. To legislate with such divergence in the standards, not to speak of the uncertainties, would at least be conflicting. One way by which to avoid this, would be to calculate all sucrose into glucose and take the increased density as the true original density. The theoretical maximum would then be 1.13, and the government requirements 66.37 per cent. of the theoretical maximum. This figure seems a very fair one, and one that should be very easily attained : and yet, in practice, during careful working, it has barely been reached.

In practice, as before stated, it is usual to allow the fermentation to proceed spontaneously. The addition of sulphuric acid or ammonia sulphate does not in the least start the fermentation. They may, or may not, improve the wash and make it a more suitable medium for the development of the yeast, but unless yeast in some way gets added, the addition of any quantity of these bodies can be of no use in starting fermentation. During grinding operations little trouble is found in starting fermentation through the addition, one way or the other, of the highly fermentable washings and scums ; but if distillation has to be conducted by itself, after a period of rest, the trouble in starting a good fermentation and the low results, will no doubt be remembered by any one who has had to deal with it. To find the reason of this we must consider what fermentation is.

Alcoholic fermentation is the change a saccharine solution undergoes when the yeast plant develops in it. Being a plant, yeast wants food very much the same as other plants, and unless the foods are there it will not develop. But every variety of plant has one special soil best suited to it; and if it is our object to cultivate any particular plant, it is to our advantage to give it the food on which it flourishes best. Yeast requires carbohydrates such as glucose, mineral matter in the form of potassium phosphate with a little of the phosphates of lime and magnesia, and albumenoid bodies which must be in the soluble state. The reason why these foods must be in the soluble state, is that the yeast only feeds, as it were, through its skin.

In molasses, we have the carbohydrates and probably sufficient alkaline phosphates, but the soluble albumenoids are altogether wanting. It is owing to their absence that fermentation is not readily started in molasses. In cane juice, on the other hand, these albumenoids are in the best assimilable state, and hence the rapid fermentation that is so easily set up. We have here a very easy means then of establishing fermentation in molasses.

A little "cush-cush" can be made at a moment's notice, which, when once fermented, will serve to start the vat. The yeast when once started has the power to render soluble the insoluble albumenoids that exist in the molasses, so that the fermentation will then proceed of itself.

The advantage of establishing a vigorous and healthy fermentation cannot be too strongly recommended. It alone produces a pure alcohol. The languid insipid vat is productive of fusel oil, besides becoming an easy prey to the action of deleterious ferments.

Yeast develops best in a slightly acid medium—this acidity should not exceed 1 per cent.—and at a temperature of 92 deg. F. If the temperature rises higher, its power is weakened, while that of its enemy, the lactic acid ferment, is increased. The lactic acid ferment develops best in a neutral medium at a temperature of 112 deg. F., but if the acid amounts to 2 per cent. its action is stopped. But, on the other hand, if the acid is allowed to accumulate, mouldiness is set up.

The only means of escape then is to start such a vigorous fermentation that the predominance of the yeast will entirely obscure the harm done by the other ferments or kill them to a great extent; for in fermentation, as well as in everything else, it is only that which is adapted to the environment that flourishes.

As it is in the beginning of the fermentation that the lactic acid ferment is likely to get a hold, the necessity for quick starting of the alcoholic fermentation is obvious. Towards the end both the alcohol and the acid developed keeps it in check, but neither of these (the alcohol and acid) restrain much the action of the acetic acid ferment which begins to be very evident towards the end of the alcoholic fermentation. The appearance of a peculiar film on the surface of the wash indicates the presence of a species of *Saccharomyces* that is busy changing the spirit into acetic acid. It should be beaten down under the surface where it cannot obtain the oxygen necessary to destroy the spirit.

This is not the Acetic Acid ferment proper. It develops throughout the whole wash and is quite a different organism. It flourishes best at the same temperature as yeast and is thus difficult to restrain,

but as it only appears after the alcohol is formed, much damage by it may be avoided by distillation at once.

The butyric acid ferment feeds on the fatty matters present. It is to the acid that this ferment produces, in combination with the alcohol, that the flavour of rum is partly due. The distillation of the wash should be conducted as regularly as possible. Any rapid increase in the temperature forces over impurities that otherwise should be retained by the rectifier. The temperature at the exit of the rectifier should not exceed 180 deg. F.

The following bodies come over with the spirit.

1. *Acetaldehyde*.—This body boils at a temperature 69.8 deg. F. and constitutes most of the vapours that come over at the starting of a distillation. Owing to its solubility in alcohol and especially the peculiar property "fusel oil" has of raising its boiling point, it, although considerably concentrated in the "heads," comes over during the whole distillation. As regards its formation, it may be produced at the expense of the alcohol, but I am of the opinion that, in this particular case, it is formed towards the end of a distillation, from the decomposition of the lactic acid, and passes into the low wines to appear in the "heads" of the next distillation. It is obvious then that if the "heads" are run into the "high-wines" side, the rectification is in great part undone. It possesses a pungent smell which is not altogether unpleasant. Its vapour is inflammable. Its presence in rum can be indicated by many tests, but probably in old rum it will all have become changed into acetic acid.

2. *Ethyllic formate and acetate*.—The ethers—The first of these bodies boils as 130 deg. F. It possesses the delicate odour of peach-kernels. It is partly to this

ether that rum owes its characteristic odour. Unfortunately, coming over with the "heads," it has to be in a great measure sacrificed for the production of a pure spirit.

Ethylic acetate is always present in rum. It boils at a somewhat higher temperature than the formate, but under that of alcohol; it also comes over in the first runnings. In a dilute state it has the pleasant smell of fruit. It is not lost in keeping, and in a rum with free acetic acid, the amount is increased.

Alcohol boils at 173 deg. F., and is a perfectly colourless liquid at ordinary temperatures. Its other properties are well known. Its action in strong doses is that of a narcotic poison. Absolute alcohol is 75.25 deg. over proof.

3. *Ethylic butyrate*, the remaining ethereal salt that is found in rum, has a boiling point of 248 deg. F. It possesses a pine-apple odour. It is made commercially as a fruit essence, and constitutes the greater part of "Rum Essence" used in manufacturing factitious rums.

4. The mixture of higher alcohols generally termed "*Fusel oil*" has a boiling point of about 266 deg. F., but not being a definite compound no exact boiling point can be fixed. It is a mixture in varying proportions of propyl, butyl, and amyl alcohols, besides some oils of high boiling point. The propyl alcohol boils at about 200 deg. and has a pleasant fruity smell; butyl alcohol has a most unpleasant odour and boils at about 227 deg. F.; while amyl alcohol boils at a much higher temperature and has a strong smell and burning taste. They are all poisonous, amyl being the worst. Their intoxicating effect is in the order I have taken them, amyl being

fifteen times, and butyl five times, the strength of ordinary ethyl alcohol.

5. *Acetal* is present in most rums to a very small extent. In some no re-action was found. It, as well as acetaldehyde, acts, it is said, first as irritants on the mucous membrane, and then on the nerves.

Exact boiling points have been given for most of the bodies enumerated above that are present in rum, but that does not enable us by keeping one temperature to separate one from all the rest. In a mixture of bodies which are all in solution, the boiling points are, as it were, blended into one another, and how much one may be separated from another is fixed by a definite law. Thus although acetaldehyde and ethylic formate and acetate come over first in greatest quantity, their presence is found in rum in which the "heads" were returned to the "low wines;" and, on the other hand, although the temperature of the rectifier never approached the boiling point of "fusel oil," we have the misfortune to find it in the rectified spirit. Most of the bodies enumerated give distinctive colours when treated with strong clear sulphuric acid, and a very good insight into the running of a still may be obtained by this simple means.

Measure out 25 c.c. of the alcohol into a small glass flask, and drop in 15 c.c. strong sulphuric acid. Pure alcohol when treated in this way gives no colouration, but the presence of aldehyde gives the solution a brown colour, and the fusel oil a dark purple.

Tested in this way, the "heads" of a still give very deep dark browns, which fall very quickly and give place to a pink with a trace of blue; which continues till

about the time when the "low wines is cut," when there is a sudden rise of colour, the dull purple predominating. The white rum itself can be tested in this way, and fair comparative results obtained.

Standard colours made from strong solutions of chlorides of iron, copper and cobalt, will serve for yellow, blue and red. The quantity of each taken to colour a quantity of water, the same volume as the mixture of alcohol and sulphuric acid, is recorded. The only difficulty is in the use of the standard colours, and that I hope will be overcome by the use of LOVIBOND'S tintometer. This instrument is divided into two parts, in one of which coloured glasses are put one after the other, till the same colour is obtained as the sample being tested, which is in the other. Both are viewed through one eye-piece so that no defects in the optical powers of the observer can influence the reading. The glasses have certain values which can be transmitted to paper directly, and thus the exact colour produced in the rum can be recorded at once.

The uses of this instrument to persons employed on a sugar estate are many. In the manufacture of yellow sugar it could be used for examining syrups and sugars, and in colouring rum, it would be invaluable.

The testing of rums which are already coloured, with sulphuric, of course cannot be done. It becomes first necessary to distil it from the colours. This should be done rapidly without the addition of any alkali, till all has passed over that can, without burning, the first-third and second-third being caught separate from the last. Halve each of the thirds, and mix them, this will represent the rum; and test the other portions separately. These separate

portions will give further insight into the nature of the rum. The colours produced are estimated as before.

“Colour” used for rum often introduces bitter bodies that spoil the flavour, besides a considerable quantity of free acid. White rum very seldom reaches 0.05 per cent. by vol. of (acetic) acid, while 0.25 per cent. is not uncommon in a coloured rum. “Colour” before being added to the white rum is composed as under.

			I.	II.	III.
Specific Gravity	...	...	1'3153	1'2775	1'2377
Alcohol	...	...	9'904	10'400	10'720
Organic Matters	...	...	62'462	60'128	47'432
* Mineral Matters	...	...	3'634	6'372	4'148
Water	...	...	24'000	23'100	37'700
<hr/>					
* Soluble in water	...	...	2'331	4'398	3'367

The results given in the table on the following page are the analyses of Demerara coloured rums. The methods used would not form very readable matter, but for those interested I may mention that the ethereal salts have been assayed by estimating the Barium salts of their acids; while the “fusel oils” were done by RÆSE’S method as modified by STUTZER and REITMAIR. The volume of Chloroform at a temperature of 80 deg. F. for pure, 30 per cent. alcohol, was found to be 22.1 c.c.

ANALYSES OF DEMERARA COLOURED RUMS.


PERCENTAGE BY VOLUME.

	1	2	3	4	5	6	7	8	9
Alcohol ...	80.84	80.40	79.19	77.39	76.68	80.56	77.32	80.98	80.19
Higher alcohols "fusel oil"	... 89.56	79.75	45.57	59.03	69.42	64.63	32.18	92.43	158.1]
Ethyllic formate ...	... 00.88	01.53	04.05	03.73	02.33	03.96	01.80	03.73	03.50
Ethyllic acetate ...	... 02.43	02.31	12.58	15.63	06.45	10.18	05.42	06.36	122.9
Ethyllic butyrate ...	... 01.01	03.34	04.99	05.10	01.15	03.02	01.65	01.86	06.61
Total acid (as acetic) ...	... 1.48	1.90	1.96	1.60	1.96	1.60	1.66	1.31	1.35
Volatile acid (as acetic) ...	... 01.18	01.18	06.00	02.40	03.00	01.16	02.40	02.21	01.15
Total solids (colour) ...	... 1.040	1.210	1.750	1.510	1.420	990	1.750	680	1.050
Potash (K ₂ O) absorbed by colour ...	... 19.74)	21.28)	28.20)	21.62	20.68)	17.95)	22.56)	19.55)	19.74)

Note on Father Breton's Carib-French Dictionary.

FROM THE "ACTES DE LA SOCIÉTÉ PHILOLOGIQUE, 1883."

Translated by Lady Chalmers.

 HIS work comprises a French and Carib Dictionary, in which not only the words are given, but also many short phrases and idioms, a little catechism, some prayers and several pages of conversations in French and Carib.

Father BRETON resided in the Island of Dominica, near Guadeloupe.

As the work does not contain any grammar properly so called, I have been obliged to try to discover the grammatical rules from the study of the text.

This study has yielded me the following results:— That the French communicated with the Caribs at that time by means of a Carib *patois*, the words of which were Indian, but in which the grammatical rules were singularly simplified in order to facilitate the study of the language—precisely as the negroes speak at the present day a French *patois*, from which all grammatical difficulties have been eliminated.

Galibi is a Carib dialect. I find universally:—

That the plural of substantives takes the forms *em*, *um*, *num*. Example—*Ouekeli*, man, *ouekeliem*; *maboya*, devil, *maboyanum*. The substantive is indeclinable. The noun in the objective is usually placed before the noun or the verb which governs it. Example—The daughter of Felix, *Felix ouoli*, and not *ouoli Felix* (Galibi). Give me a potato, *napi* (potato) *amiarou* (give me). (Galibi).

The Personal Pronoun : Of this there are two forms, the one making a separate word ; the other annexed to words, and not appearing except as a composite particle. I or me, *as*. As a composite : *ni*, *n*, *na*. Example — *Iroupa*, good, *niroupati*, I good am, or *iroupatina*, good am I.

I, <i>ao, n, ni.</i>	Thou, <i>amanle, bi, b.</i>	Him, he, <i>l, li.</i>
<i>None,</i>	thee <i>bone</i>	<i>lone</i>
<i>Noaria</i>		<i>loaria</i>
<i>Nome</i>	<i>bome</i>	<i>lome</i>
<i>Nouago</i>		<i>louago</i>
<i>I</i>		<i>liem</i>
<i>Ia</i>		<i>loman</i>
<i>Noa</i>		<i>lia</i>
		<i>lao</i>
		<i>lao</i>

I am unable to see whether the Pronoun is indeclinable, or appears in its various forms joined to a preposition which governs its relations with the other words of the phrase.

The Possessive Pronoun.—Mine, thine, his, are expressed as I, thou, him, in composition. *Ouboutou*, captain ; *nonboutou*, my captain. Pronoun this, *li ki*.

The Verb.—It is still more impossible to gather from the text of Father BRETON the rules for the conjugation of verbs than those for the declension of pronouns. I can only give a series of terminations :—*Ti, eti, ati ; eli, li, enli ; em ; enrou, enroukia ; ba, bae, ca, cae* (Imperative forms) ; *couaca*.

It is evident that each of these terminations must have a meaning, but in the text they are constantly used interchangeably.

The only indication which I have found for the distinction of the active from the passive is the following :—

To kill, root word *apara* ; he who has killed, *aparouti* ; he who has been killed, *aparououti*.

Every root word becomes a verb by the addition of a verb termination. The negative is expressed either by a separate word—*oua*, no—or by the addition to words of a negative particle, *m*, *ma*, or *pa*. Example—*aparabae*, kill, *maparabae*, do not kill. Do not abandon me, is translated thus: *in outa* (to abandon) *pa* (negative) *ba na* (me, imperative form).

“And” is expressed by two words, *aca* which is employed separately, *kia* which is put at the end of a word. Example—*huyeu aca nonum*, sun and moon; *huyeu, nonum kia*, sun, moon and.

Prepositions.—It would be very important to distinguish these thoroughly. Probably, Father BRETON'S dictionary explains them but imperfectly, and does not give the meanings with sufficient precision:—By, *oroman* ; before, *oubara* ; above or upon, *tao*, *louago* ; under or below, *abou* ; more than, *oaria* ; for, *itara* ; to (to such a place) *ta*, *ka*, *bou*, *oman* ; there, *iaim*, *checm* ; near to, *imalé*, *oman* ; actually, certainly, *k*, *ka*, at the beginning of a word in composition, constantly in use as a confirmative particle ; in vain, *lie* ; where, *allia*, *alliati*.

SOME WORDS.

Agouti, <i>ilirou-alirou</i>	Baskets (various) <i>bacalla, ouaroulli</i>
Anger, <i>erecou</i>	Battle, <i>etoucou, aincoua</i>
Arnatto, <i>ollocamboui, chourou-</i>	Beard, <i>itiouma</i>
<i>couli, ematabi, cochehue, bichet</i>	Believe, trust, to, <i>moinga</i>
Arrow, <i>bouleoua</i>	Be quiet! <i>maniba</i>
Asmuch, <i>enoura</i>	Billhook, sabre, <i>houehoue, cabou-</i>
Avaricious, <i>amoinbeti, akinti</i>	<i>rane, chercha</i>
Banana, <i>balatana</i>	Blood, <i>timoinalon, ita</i>

Bow, <i>oubaba</i>	Fear, to, <i>tinali</i>
Breast, teat, <i>tibanatiri, touri</i>	Fire, <i>ouattou</i>
Bring, to, <i>erera</i>	Fish, to, <i>atica, atiacca</i>
Brook, stream, <i>tipouliré</i>	Fish, <i>aoto</i>
Buy, to, <i>abeci</i> .	Foot, <i>nougouti</i>
Cabbage, <i>taya, ouaheu</i>	Formerly, <i>binale</i>
Calabash, <i>camoucoulou, commori, tonton, matalou, huira</i>	Funnel, <i>manicoulaca, cataoli</i>
Canoe, <i>couliala, oucounni hueri, canoa</i>	Garden, (cultivated field) <i>maina</i>
Captain, <i>ouboutou</i>	Give, <i>boman</i>
Captive, <i>tamon</i>	Good, <i>iropou</i>
Cassava, <i>aleiba, marou</i>	Good day, <i>abouica</i>
Come, to, <i>memboui, achilera</i>	Grate, to, <i>ayara, akiara</i>
Come! <i>hac, galibi caiman</i>	Grandson, <i>iraheu</i>
Cotton, <i>icallépoué, manhoulou ouamoulou</i>	Groundnut, <i>manli</i>
Courageous, <i>benepeti</i>	Hair, <i>oueche, itibouri</i>
Cry, <i>ioulali, ayacouati</i>	Hand, <i>noucabo</i>
Cutlass, <i>bouy ani</i>	Hatchet, <i>houehoue, araoua</i>
Dance, to, <i>abinaca</i>	Herb, (medicinal herb) <i>itobou</i>
Debauchee, <i>huere</i>	Hear, to, <i>acougnouca</i>
Deliver, to, <i>emeignoua</i>	Hoe, <i>itonomi, atoullagle, chicouba</i>
Devil, <i>maboya, oumecou, couloubi</i>	Honey, <i>mamba</i>
Die, to, <i>icotama, lilarouni, lihuechetali</i>	Hook, bait, <i>keoue, ouboure</i>
Dirt, mud, <i>iallali</i>	Hot, <i>bacha</i>
Doctor or sorcerer, <i>boye, agnouracati</i>	Hunger, <i>illama, amine</i>
Drink, to, <i>chinaim</i>	Hurricane, storm, <i>bointara, iouallou</i>
Dress, ornament, <i>inacouli, atacouli</i>	Hut, cabin, <i>auto</i>
Earth, <i>monha</i>	I, me, <i>ao, inara, noucouya</i>
Enemy, <i>etounoucou</i>	Jealous, <i>emiinteti</i>
Eye, <i>enoulou, acou,</i>	Jest, to, <i>alele</i>
Fatigue, <i>ichi</i>	Jewel, <i>eneca, iari</i>
Father, <i>baba, iouman, noucouchili</i>	Leaf, <i>aroubanna</i>
Father, grand, <i>tamoucou, itamonlou, nargouti</i>	Light, nimble, <i>chouneti, mereti</i>
Fast, to, <i>enemai</i>	Light, <i>hiati, okaali</i>
	Little, <i>raheu</i>
	Loose, <i>abaouati</i>
	Maize, <i>ouachi marichi</i>
	Make, to, <i>anira, achicaboui, ateca</i>
	Man, <i>ouakelli, eyeri</i>
	Meadow, savannah, <i>hoi</i>

Mistake, to, <i>aboara</i>	Sky, <i>oubecou</i>
Mock, despise, <i>chenocai</i>	Slothful, cowardly, <i>abaouati</i>
Moon, <i>nonum, cati</i>	Sleep, to, <i>baronca</i>
Mother, <i>ichanum</i>	Snake, <i>hehue</i>
Mother, grand, <i>inouti, naguetté</i>	Son, <i>imacon, imoulou, itaganum, iraheu</i>
Mountain, <i>ouebo</i>	Speak, to, <i>arianga</i>
Name, <i>ieti, niri</i>	Spirit, soul, <i>iouanni</i>
Night, <i>huetou, ariabor</i>	Stinking, <i>kemere, tikele</i>
Noun, <i>oua</i>	Stone, <i>tebou</i>
Oar, <i>aboucouita</i>	Sun, <i>hueyu, cachi</i>
Other, <i>amien</i>	Tobacco, <i>iouli</i>
Papaw, <i>ababaie aleule</i>	Thank, to, <i>ayaora, (root) yao</i>
Parrots (different kinds) <i>coulehue, alallaron, coulao, aballaoua, herere, cecerou, onicoali</i>	Thou, <i>amanle, boucoya, ibourra, bi, b</i>
Peace, <i>embouloui</i>	Thy goods, <i>aketaba</i>
Peril, <i>acononi</i>	Tigers (different sorts) <i>malacaya, caicouchi</i>
Pitch, <i>mani</i>	Tired, <i>icomouloui, akinta</i>
Pot, <i>tourae, tomalaca, ouchou</i>	Tomb, <i>nonamotobou</i>
Potato, <i>mabi, noule</i>	Tooth, <i>iepa, ieri, nari</i>
Precipice, <i>aconagle</i>	Tree, <i>huehue</i>
Prick, sting, to, <i>achara</i>	Two, <i>biana</i>
Queyu, lap-apron, <i>norire, nenoin-goulou.</i>	Village, <i>aote ; Galibi auto</i>
Quid, <i>chike</i>	Water, <i>tona</i>
Rain, <i>conobo</i>	Weeding-hook, <i>chicoula, achar-achi</i>
Reside, live, <i>tabiala</i>	Why, <i>catouago, catitiem</i>
Rich, <i>tibouinati</i>	Widower, <i>moincha</i>
Road, <i>ema</i>	Wild pig, <i>bakira, boinke</i>
Rob, to, <i>ialouca</i>	Wind, <i>bebeiti, nemecli</i>
Robust, <i>balipfegouti</i>	Witchcraft, sorcery, <i>tachin, lou-catabou, linharone.</i>
Say to, <i>arianga</i>	Woman, female <i>ouelle, in general ; wife, tabouite, ianni</i>
Scarify to, <i>apuitacoua</i>	Year, <i>chirie</i>
Sea, <i>balanna, balaoua</i>	Yes, <i>hanhan, iritelam, terei</i>
See, to, <i>chemain, neupata, arica</i>	Yesterday, <i>cognale.</i>
Servant, <i>abouyou</i>	
Shoot, stem, <i>akecha</i>	
Sieve, <i>manale, hebechet</i>	
Sister, <i>iananti, nitou</i>	

On the Upper Demerara River : About and Above the Great Falls.

By the Editor.



SO much has been previously published by various writers concerning the Lower Demerara River, that an apology would almost be owing to colonial readers for the presentation of still another account thereof.* This, however, is not the case with the upper parts of the river. The Indian track at Cumparu, leading across to the Essequibo above its lower rapids, has long been a favourite track for travellers by which more easily to reach the higher parts of that river, and may therefore be regarded as well-trodden ground ; while to the Great Falls of Oruru-Mallali, there have been frequent visits made, more particularly, perhaps, by the various pastors connected with the Mission Stations along the river. Of the district above the Great Falls, but little is commonly known, casual visitors being altogether choked off either by the inability to procure crafts above, or by the very great difficulty of the long portage along which boats

* In his very amusing and interesting, though peculiarly heterogeneous, " Chapters from a Guianese log-book," a very detailed and diffuse account of the Lower Demerara District, below the Falls, is given by the late Revd. C. D. DANCE, to which work, the reader who wishes to become familiar with the chief features and places of this lower district is referred. It is to be regretted that more care was not taken, in the department of Natural History at least, for the dissemination of more accurate information than is often to be found in the pages of this otherwise praiseworthy work.

would have to be drawn—a difficulty due to the abundance and sharpness of the rocks along the course, and the slipperiness of the clay which is found at the steeper parts of the portage, and which seems to be kept in an uniform condition of moisture by rain and vapour—not to speak of the necessity of laying skids and clearing the track for pulling over, such as would have to be done at any portage that was but rarely thus used.

More than twenty years ago a special report on the Demerara river was made by Mr. J. G. SAWKINS, one of the Geological Surveyors of the colony, in which a short description of the district above the Great Falls apparently to a distance of about 35 miles, was given; and later on this was supplemented by an equally short report by Mr. C. BARRINGTON BROWN, who had travelled overland to the Demerara from the Berbice river; but the descriptions given were, in both cases, extremely meagre. An account, embodying a more detailed description of this district, to a point some distance beyond that reached by the surveyors, may not therefore be without some special interest.

The features presented by the lower portions of the river, as in the tidal waters of the colony generally, are extremely monotonous, the slightly elevated tracts along the banks, such as those at the Sand Hills, Dora, and Three Friends, where more or less abrupt clearings are met with, affording quite a pleasing contrast with the general character. As one travels on, the elevated tracts become more numerous, rising in some places into hills, and the aspect of the country is correspondingly more pleasing, while some charming little

spots, the sites of small settlements, delight the eye—such as Paripe, where the slightly raised banks are covered with short grass, lined or studded with low spreading and richly green-coloured trees, among which nestle groups of picturesquely thatched houses, of which but glimpses can be caught at times between the openings; while overhead tower cocoa-nut and acouyeroo palms, with here and there dense clusters of the graceful bamboo trees.

It is at Seba, however, 13 miles beyond Akyma where the steamer stops, that the charming features of the river culminate; and as seen from above, where a sudden bend brings it into full view, the place is altogether delightful. At the end of a long avenue of dark water banked in by the high forest, rises, for more than 100 feet, the great rounded mass of rock sloping somewhat abruptly down from the middle. On the left side, the river, which really bends away sharply, seems to end directly on the rock; while, on the right, it opens out into a wide-curved bay arched round by the trees. The bare rock crops out along the riverside, up to the door of the neat-looking wooden house which occupies the middle of the hill, and at the sides where several thatched sheds give a very picturesque appearance to the scene. Above and beyond the house, the hill rises, extending for some distance, and covered with short green grass, on which various domestic animals browse; while tall cocoa-nut and acouyeroo palms, and immense mango and bread-nut trees in the immediate background of the house, form a magnificent bower to the little settlement. As a picture of peaceful and beautiful rusticity, the view is unsurpassed by anything else to be found on the river.

It is saddening to think of the vast change that has come upon such a place as Seba since the days when WATERTON trod the wilds of Guiana. Then it was a busy centre—the official residence of the Post-holder, and a rendezvous for the Indians: now there is but the remembrance of its former glory.

When one considers the urgent need that exists for some health resort within easy reach of the coast, it seems a wilful neglect of opportunities to leave such a peculiarly advantageous spot unused. Less suited for such a purpose than Arrisaro, (See *Timehri* No. xv. [1889] p. 118), Seba yet gains an advantage in that it could easily be reached by special steamer from town in one day, and would be a most convenient resort for a short holiday or change—if only for a week. From the extent of the rock, which is gneissose granite, and the grassy hill and slopes, a considerable amount of exercise would be ensured—not to speak of the hunting and shooting to be obtained in the forest around. Splendid views of the surrounding country can be secured from the top. Delightful trips could be organised up the close-lying creeks, or along the river to Tiger hill—a projection of granite and greenstone, with large superficial accumulations of impure ores of iron, on the West bank, some ten miles above—where, from a height of about 380 feet, views of the low-lying country are to be obtained; or a little further on to Mallali, where the excitement of shooting the rapids, though in this case of a safe kind, may be experienced; while bathing and fishing may be indulged in to one's heart's desire.

For a comfortable change, however, more accommoda-

tion would be essential than it is at present possible to depend upon. The owner of the house might not be willing to admit strangers; and from the exposed position, camping in the open might not be beneficial for all. The planting of a few more trees along the top of the mound, would not only vastly improve its appearance, but would secure a grateful shade from the intense heat of the sun. From its situation, a settlement would be fully exposed to the breeze, and its natural drainage would necessarily be most efficient.

Our reminiscences of Seba, in spite of its delightfulness, were not altogether pleasant, for it was here, that a wretched-looking sow ruined more than a dozen of the birds' skins that had been prepared. The specimens had been placed in the sun to be dried, on a part of the bare rock; and while some of us were rambling over the hill, and others were busy preparing breakfast, the pig came upon the scene, and, all unnoticed for a long time, mangled nearly the entire set, a few feathers only being left of some and a wing or tail of others. As they were poisoned with arsenic, the poor brute must have suffered considerably afterwards.

All along the river, through the rapids at Mallali, and for some considerable distance above, the timber which forms the great and almost the only trade of the district, is met with being floated down stream; and occasionally a boat may be encountered in connection with the gold industry, which, however, has not, up to the present, been of any importance on this river, though Mr. GRAY'S placer at the head of the Apparoo creek is still being worked and is said to give a little more than enough to pay its expenses.

Above Mallali the land becomes, on the whole, somewhat more elevated, and the high banks afford most pleasing sites for the various settlements, of which a typical one may be found at Welbisirie-canally, some 16 miles above the rapids. In many places where the land is low and swampy, the river bends and winds in an extraordinary manner and adds considerably to the distance to be travelled, though, if one's boat be small enough, the etaboos, or small forest-arched water-paths which cut off these bends, afford frequent opportunities of avoiding the extra pulling, and at the same time give a very pleasurable change from the open river.

At Mecropie, some 28 miles from Mallali, and at Derrire about five miles further on, hilly ranges of from 250-300 ft. abut on the river, and break the monotony of an even forest line. Below Mecropie, and again at some little distance below the rapids at Cumparu, gravel banks are met with, made up very largely of pebbles of celluloid iron ore and ferruginous clay, mixed with trap and quartz fragments. Between these points, the course of the river, which is of a general northerly direction, alters suddenly, and for about twelve miles the flow is due East, between two ranges of hilly tracts. Above Cumparu, swampy land with numerous etaboos is again encountered, till at about a little more than 70 miles from Akyma, elevated sandy plateaux begin to line the river, forming the outer extension of the rocky range of hills which stretch from the Mabooroo mountain, and give rise to the long cataraacts commonly known as the Great Falls of the Demerara.

Up to this point, the collection of natural history

specimens made, especially after the accident at Seba, was very scanty. Two of the rather uncommon brown two-toed sloth (*Cholæpus didactylus*), mother and young, had been shot just within the opening of the Manabadin creek; three specimens of the red-throated chatterer (*Pyroderus scutatus*), had been procured along the path at Mallali; three good specimens of night-jars or goatsuckers, of an uncommon species, had been obtained one evening at Mule-pen, opposite Derrire Hill; while several of the beautiful red-backed hangnests (*Cassicus affinis*) had been taken at various points along the river, where they frequented the large trees in the clearings with dozens of their long nests hanging from the ends of the branches. Besides these, a few of the large and handsome king-fishers (*Ceryle torquata* and *C. amazonica*), and the large yellow-tailed black bunyas (*Ostinops decumanus*), and other birds which frequent the water-side, had been added to the collection. The so-called bush carrion crows or bultata (*Ibycter americanus*), which were constantly, to be heard hoarsely and discordantly cawing in the high tree-tops, and of which I particularly desired to obtain specimens, never gave a good chance of a shot, though they were frequently seen.

A very interesting form of the lizards, the Chalcis (*C. flavescens*), had been obtained at Cumparu, together with a cœcilian; but, with the exception of these, scarcely a reptile had been seen. The chalcis lizard is very peculiar in appearance, being small and snake-like, possessing two pairs of extremely minute limbs, in which three digits are but barely represented by minute divisions. The elongated tail is very easily

broken off, and the slightest rough handling seems to cause the little animal to part with it.

Of insect forms, the commonest noticed was the splendid, broad and blue-barred *Morpho achilles*, but the specimens, where they were close enough to be reached, were frequently so scratched and so much jagged on the edges of the wings, as to be scarcely worth the trouble of keeping. The common speckled *Anartia*, and about equally common yellow *Callidryas*, were frequently to be seen; while the lovely, black and green banded *Urania leilus*, and the black-barred white *Papilio protesilaus*, occasionally flitted past us down stream.

The chief features of the vegetable life of the district—those features which give the finishing touch, as it were, to the more marked characteristics due to the natural configuration of a country—were in themselves by no means uninteresting, though to one familiar with the river scenes of a tropical forest, they were, on the whole, monotonous—except where the sward of a settlement broke the line of forest by the waterside. Along the swampy districts, the forest was composed of low and densely crowded trees, among which the common water mora, water wallaba, corkwood, etc., were abundant, dotted here and there with various palm trees, and often matted over with the thickly spreading coomaroo creeper, brilliant with its pale mauve flowers. In the higher districts, the gigantic mora, at times gorgeous in its variously-coloured young foliage, towered above all other trees by the waterside, among which trysil, wallaba, dally, arrisourou, hooboodie, etc., were frequently to be distinguished, with the graceful manicole and other palms peeping, as it were, through them. Scattered on

the branches overhanging the water, the red-tinted flowers and foliage of the wild pines, and the clustered inflorescences of various orchids, threw an air of gaiety over the scene, and lovely groups of *Batemannia*, *Maxillaria*, *Epidendron*, and more especially of cream-flowered *Brassavola* and red-tinted *Rodriguezia*, which often grew in dense masses, garlanded the old branches, as though they would restore some semblance of youthfulness to their host.

The petrology of the river bed, which so often in the dry weather gives the most valuable indications of the nature of the surrounding country, was almost entirely indeterminable, the water being too high, a condition which was unfortunately but intensified during the remainder of the trip, owing to the heavy rains. All the features of the rocks, such as the granite at Seba, and the granite and trap rocks, with the abundant association of ferruginous ores, such as at Tiger hill, Mallali, Mecropie and Derrire, that were determinable, were already well ascertained, and were indeed those that gave the most marked character to the country.

At the mission station and Indian village of Eneyudah, charmingly situated on a sandy elevation of about 60 ft. on the West bank, about four miles below the Great Falls, and where splendid views can be obtained of the eastern bank, a camp was made, and the great bulk of the stores etc., was deposited. One would have imagined that at such a place, fowls, fish and vegetables would be easily obtainable; but it was far otherwise. No fowls were kept, even by the resident schoolmaster. Fish was caught now and then, in a spasmodic sort of way, occasionally a haimara, but generally

some wretched little objects that would tempt not even a healthy appetite, but which, when boiled up with a largely preponderating quantity of the inevitable peppers, gave, just as the best fish also would only give, a highly nutritious but exasperatingly hot mixture, that the trained throat alone could regularly brave without flinching. As to vegetables there were none to be had, not even a yam, a sweet cassava, a potato nor a plantain—not even a sight of one anywhere!

The Great Falls of the Demerara river are very beautiful, but as they have often been described, there is no necessity for more than a passing notice of them here. As seen from below, the view closely resembles the Marchughi Falls in the Puruni river, a painting of which is to be seen among the views of the colony in the local Museum, but the surrounding lands of the Demerara are higher. A central rocky but tree-covered island separates two much inclined cataracts of foaming water, while on the western side there are other large channels, around smaller islands, the courses of which are hardly to be seen except by walking along the bank or from close up to the basin. The banks on each side rise sharply into forest covered hills, which form a picturesque framing for the foaming cataracts and rocky islands. At the upper part, and for some 200 yards, the water rushes along in one rocky channel, leaping down by a series of small falls, and it is owing to the great force of the water in some of these upper channels, where the bed is narrowed between huge rocks, that it is impossible to haul up boats by water.

The barrier rock consists entirely of greenstone, the junction with the granitic rock through which it has been

forced, being very clearly shown in parts below the falls, and more particularly in a broad mass by the basin on the eastern bank. Here the dike rock is extremely fine-grained, closely resembling petro-silex, and it is seen branching out in veins along the lines of fracture of the granite, whose felspar crystals are of a delicate pink colour.

Fortunately for us, several woodskins, belonging to Indians who were then staying at the Mission, were to be obtained at the upper end of the portage; and we were thus saved the trouble of hauling our boats through the forest—a proceeding that would have entailed quite a day's extra work, owing to the very bad condition of the track, and the amount of making up and clearing that would have been unavoidable.

Above the portage, the banks of the river are formed by high hilly tracts, covered with tall forest trees, among which magnificent specimens of mora, greenheart, crabwood, arrisouroo, siruaballi, etc., are to be found; and it is not until the wide mouth of the Hooroowa creek, on the East bank, is reached that the change to low and swampy land becomes pronounced. The Hooroowa is said to lead into the Coorabaroo creek, which runs into the main stream at some little distance below Mecropie hill, some 20 miles down, and thus affords a means of avoiding the Great Falls in journeying to the upper reaches of the river. Soon after passing the Hooroowa creek, a large lake-like opening is met with, commonly known by the name Aponbaroo, which is said to be the haunt of the muscovy ducks in the dry weather, and where, indeed, high as the water was, three or four of these birds were unexpectedly startled from among the trees at the entrance.

All along this district of the river and for some considerable distance upwards, the banks are low and clayey, and the whole country becomes swampy, the forest growth being generally of the kind characteristic of such regions. Even where the banks are slightly raised, the land within sinks into low-lying districts, which in times of pronounced dry weather may possibly be uncovered by water, but which now were intersected by the etaboos which are so common in such districts, especially where the course of the river is winding and irregular. Here game was quite unobtainable; and the Indian hunters that were brought up from the Mission for hunting purposes, constantly returned empty-handed.

It was at a camping place in this swampy district, some 16 to 28 miles above the Great Falls, that, for the first time in my travelling expeditions, I experienced the sensation of being surrounded by almost a constant glow of light from various forms of fire-flies. Waking late on a pitch-dark night, I was utterly astounded for the moment by the almost continuous flashing of the lights, the sizes of which were out of all proportion to the bodies of the small fire-flies commonly found on the coast. At three separate times during the night, I made attempts to procure specimens, under the impression that at last, I had alighted upon examples of the magnificent Hemipterous lantern-fly, *Fulgora lanternaria*, which MADAME MERIAN, in her unique description of the insects of Surinam, so carefully figured and described; but in each case I was compelled to recognise, instead, specimens of the Coleopterous forms, such as *Pyrophorus*, *Aspidisoma*, and *Photinus*, though, owing

to the swamp, over which they hovered in myriads, not a single specimen was procurable.

Earlier in the trip, at Mule-pen, where a camp was made one night, luminous forms of larvæ, one quite small and the other elongated, in all respects similar to the flattened larvæ of many of the *Lampyridæ*, were procured in the grass late in the evening; and as at the same time, adult specimens of two species of the *Aspidisoma* fire-flies were taken at the same place, it seems conclusive that these were but the related stages of larvæ and imago, especially as no other form of firefly was noticed in the neighbourhood. The larvæ were luminous at the terminal segments of the abdomen, and were peculiarly flattened, and furnished with an extremely expanded and shield-like thorax, quite covering the head. The two species obtained were the small *Aspidisoma ignitum*, with its lateral, oval, yellow areas, one on each elytron, and the large and dark-coloured *Aspidisoma dilatatum*. A third species, *Aspidisoma maculatum*, which is common on the coast, was not noticed in the district. The genus is rendered very peculiar by the expanded and shield-like thorax and elytra, which project considerably on both sides; and it may thus be readily distinguished from the other *Lampyridæ*. The luminous form of the spring-beetles, such as *Pyrophorus*, in which the larvæ are luminous along all the segments of the body, and the adult on each side of the thorax and at the basal anterior part of the abdomen, cannot, of course, be confounded with the members of this family.

At the time of Mr. BARRINGTON BROWN'S visit in 1872, an Indian village, Orura-cobra, was situated at about three bends above the Great Falls, but it has long

been forsaken, there being no vestige of it now remaining; and until the Booboo creek, which is situated some 20-25 miles further up, is reached, no settlements are met with. At about some 10 or 12 miles from the falls, a small clearing, Wakakobi, is found on the East bank, where there are two or three benabs, with some plantain, papaw, pepper and pumpkin growing, and with paths leading to a cassava-field aback; but this has lately been deserted, and is doomed soon to be overgrown by the forest, just as is now to be perceived at another less recently deserted settlement, Karawa, about some 8 or 10 miles further on, on the West bank, where the bush has already taken over a great part of the clearing.

It was at this latter place that a very memorable encounter with chigoes (*Pulex penetrans*) took place. All unsuspecting of such creatures, we had entered the old deserted houses and examined the various old implements that had been left about, and it was not until some little time after, when one of the men had entered and almost immediately had felt chigoes and fleas on his bare feet, that the cry of "chigoes" was raised, and a stampede ensued. Owing to the long time that the little pests had had to penetrate into our canvas shoes, woollen socks and flannel trousers, an enormous number had accumulated, and for the greater part of the day gave occupation for their riddance. So painstaking was the search, that but one or two escaped notice, and remained to be picked out at a later day. The most unpleasant aspect of the case, however, was the uncertainty as to the part of one's body that the little pests might penetrate, since as they were many of them at

large in the boat, their opportunities were by no means limited to one's feet.

In this neighbourhood too, a magnificent green Boa was obtained. It was noticed by one of the boatmen, who by nature seemed to possess a wonderful faculty for perceiving snakes among the bushes as the boat passed by, and in places where it often required close search ere any other person could detect them. In this case, it was particularly difficult to perceive the snake which was but a green body lying across the green bushes overhanging the river side. The markings of the species are most handsome and striking: the body being of a deep and vivid green with a series of transverse, narrow, sometimes diamond-shaped, yellowish-white areas, arranged like a mosaic along the back, and outlined by a darker green fringe; while the large ventral scales are of a pale cream-white colour, and the lower part of the sides of the body are of a bright yellow, spotted with green. The edges of the upper and lower lips are yellow, and lined by a series of deep pits, giving a peculiarly open appearance to the sides of the head; and the eyes are greyish-brown, with a slit-like transverse pupil. The snake is known to the Indians by the name of "Wyopomoi."

About the same time, another specimen of the same species, had been obtained, as I afterwards learnt, at the Morawhanna passage in the North-West District, and was brought to the local Museum by Mr. J. F. A. RAWLINSON, who accompanied His Excellency the Governor to the District. This specimen has been since then, and is still, exhibited alive in the Museum. It is curious that the markings on this snake are almost identical

with those found upon another rare Boa to be obtained in the colony, in which the ground colour, however, is of a brilliant red. A specimen of this latter had been shot, in the early part of the year, while coiled in a tree along the Mahaicony, but it had sunk in the creek ere it could be grasped; and Mr. T. C. DUGGIN of New Amsterdam had previously presented a specimen to the Museum from the Upper Berbice river.

WATERTON had noted long ago that snakes were plentiful along the Demerara river, and though he refers only to the district between the coast and Seba, yet it seems equally, if not more, applicable now to the district above; for while we encountered but one, and that a small and harmless one, below Cumparu, we frequently came across them, and often poisonous ones, along the higher reaches of the river.

At Eneyudah, one morning, just at daybreak, a large bushmaster (*Lachesis mutus*) was detected lying across the path down the hill to the waterside, but before it could be killed, it had crept into a thick and close bushy cover, in which it proved hopeless to find it. On another occasion while we were engaged in looking for a bird which had been shot by the water-side, at the foot of this bushy cover, a medium-sized labarria (*Trigonocephalus atrox*) was encountered and killed, and its skin utilised for the collection. Just above Wakakobi, two red, but harmless, colubrine snakes, about six or seven feet in length, were discovered and shot—one while coiled upon a branch, and the other apparently struggling with some ground bird which was making a fight for its life; while a little further on, a common black-tail (*Spilotes variabilis*) was shot

among the bushes overhanging the water, but was lost in the river. At a camping-place just below Karawa, a young labarria had scuttled away almost from under our feet, as we wandered in the forest in the early morning; while yet another labarria, on another occasion, had been disturbed among the débris under a spreading semito vine that covered the bushes by the houses at the same settlement. Some time later on, yet another specimen was secured—this time a large and rare colubrine, 8 or 9 ft. in length, and known to the Indians by the name "haimarara."

In the neighbourhood of the deserted settlement of Karawa and upwards, the land becomes higher, with steep clay banks, and at about three miles further on, at Pongabi, on the East bank, where some years ago there was another Indian settlement, large masses of granitic rocks (*syenite*) rise above the river. Just above this, the Booboo creek opens on the West bank. Along this creek there is a large Indian village, situated on a hill, and reached by a winding road, about a mile in length, from the creek mouth, but of whose proximity, hidden away as it is in the forest, the casual traveller along the river would be absolutely unaware. The three settlements, Ichiderie, Sarabaroo and Atakapara, which are to be found higher up, are also similarly situated, and there is nothing at the various creek openings to indicate their existence.

Booboo appears to be a thriving settlement, pleasantly situated, and with fertile land in its vicinity. Extensive cassava fields, and splendid clumps of banana and plantain trees which almost surround the village, give an air of plenty that is but seldom an apparent feature of

an Indian settlement. Numerous hilly ranges traverse the district, being, on the one side, the southern extension of the Mabooroo range, and on the other, the northern spurs of the Wahmara mountain. Animal life seemed to be plentiful in the district, and on each occasion of our visits to the village, we were able to procure pieces of abouyah or of deer, which were being babracoted.

Not far above Booboo, the site of the old settlement of Muniparoo, is passed on the East bank. This place appears to be identical with the Anaimapeur of Mr. BARRINGTON BROWN, and the Kunimapoo of Mr. SAWKINS. It was somewhat perplexing to find that the names of places obtained from the Indian hunters, and taken after numerous repetitions, often differed very greatly from those given by each of the surveyors, and sometimes to such an extent as to make it almost impossible to collate them; and this difficulty was intensified by the fact that many of the distinctive, physical features of the river, which were apparent during the peculiarly dry season when Mr. SAWKINS visited the district, were now entirely obscured by the swollen state of the river, owing to the heavy rains which fell almost regularly during the greater part of the days, and more especially throughout the remainder of the expedition.

Along this upper district, the indications of animal life were markedly more numerous and interesting than below the Great Falls. Often by the waterside the trampled bushes told of the maipurie or tapir (*Tapirus*). At frequent intervals, the continuous roaring of the howling monkeys (*Mycetes*), or the curious whistle-like cry of the quata or spider monkey (*Ateles*), told of their near presence; while not infrequently the

little squirrels, of the common South American species (*Sciurus æstuans*), slid lightning-like down the branches of the trees by the waterside, as though in a great hurry to place themselves out of sight and out of range. In the forest, as already mentioned, species of deer (*Cariacus* and *Coassus*) and peccary (*Dicotyles*) were obtainable, though our lazy and wellnigh worthless Indian hunters, who had been recommended to us by the schoolmaster at the mission station at Eneyudah, came invariably empty-handed from the chase. The common little grey river bats (*Rhynchonycteris naso*), which are always to be seen during the day suspended like fungous growths from the under sides of the stumps and thick branches overhanging the water, flitted on our near approach from shelter to shelter; while at night, other species, and among them the blood-sucking bat or so-called Vampire (*Desmodus* or *Phyllostoma*), which now and then shewed himself by an operation on somebody's toe to be the true "colony doctor," as he is commonly termed, wheeled backwards and forwards about the camp.

The birds were, on the whole, considerably more abundant, though, of many of them, the cry alone gave indication of their presence. The rare yellow and red-headed vulture (*Cathartes urubitinga*) circled high overhead, or rose, at times, from his feast on some putrescent matter by the waterside. Various species of hawks, (*Elanoides*, *Hypotriorchis*, *Accipiter*, etc) at times crossed the river, or perched on the high dead branches along the banks. The great green-winged, blue and red macaw (*Ara chloroptera*), sometimes, and various species of parrots, constantly, crossed shrieking hoarsely over-

head, and generally high out of range. In the forest around, the puppy-like yelping of the toucans, and the loud drumming of the wood-peckers, rang out at all hours of the day—at times so loud indeed were the peckings of the red-necked woodpecker (*Campephilus rubricollis*) that it was difficult to imagine their connection. The swallow-winged barbet (*Chelidoptera*), whose constant perches are the tips of the high dead branches by the waterside, the red-bill (*Monasa*), the lovely yellow and red-breasted species of trogons, and the equally lovely jacamars, with species of tree-creepers, cuckoos, bush shrikes and tyrant shrikes, hang-nests, tanagers, king-fishers and humming-birds—at rare intervals, the brilliant Karabimiti or King humming-bird (*Topaza pella*)—were by no means uncommon in the branches overhanging the water.

On all sides, the greenheart-birds (*Lathria cinerea*) incessantly rang out their piercing “pi-pi-yo.” High overhead, hidden away in the branches, the bultatas shrieked: and the bare-headed chatterers or quow-birds (*Gymnocephalus calvus*) bellowed, with a sound as though from a herd of oxen grazing in the forest. The notes of this last bird are astonishingly loud, but when heard from a distance, through the forest, they are remarkably like the more musical sounding of the campanero (*Chasmorhynchus niveus*), and might often be mistaken for it.

The reptiles met with have already been referred to; and the insects, in all respects, were identical with those species found lower down.

For several miles above Booboo, the current of the river is extremely strong, and the banks become elevated and rocky as the Wahmara mountain range is

approached. The forest growth on these higher lands takes on noble proportions, gigantic mora trees, with greenheart, dally, trysil, crabwood, arrisourou, wallaba etc., being seen in all directions.

At the Wiribaroo creek, where, on the West bank, a cascade is found—the water rushing and roaring down a steep incline—the river flows for some distance due West, with a very heavy current, over an inclined bed, where evidently in the dry weather a set of rapids must exist. Until the range of hills is passed, the same heavy current is encountered, accelerated here and there at wide intervals, where the various creeks join the river, as at Embibaroo, on the East bank, where another cascade is met with, and at the Sackabaroo and Oobaroo creeks, also on the East bank, some miles further on. The gravel banks and rocks, which, at these points, are said to produce rapids in the dry weather, were now quite covered, but the impure ironstone which forms the great, if not the entire bulk of the Wahmara range, was seen on all sides.

At a short distance above the Sackabaroo creek, the road which is said to lead out by the Akaiwanne creek on the Essequebo river, is met with. There appears to have been several paths formerly used to cross over to the Berbice. Mr. SAWKINS mentions one from the Oobaroo creek, which, at the time of his visit, had been abandoned for another lower down, by which the distance was less ; while Mr. BROWN, four years later, crossed over from the Berbice by the Itaburro creek—a name that was not recognised by the Indians with me. From the context in the report, the Itaburro creek would seem to be identical with the large Oobaroo creek, though there is now no village of Paintecobra to confirm the identification.

It was just below the Sackabaroo creek that the large "Haimarara" snake was procured. Coiled as it was among a thick bushy tuft, where the tail alone was visible and was mistaken for the front of the body, the snake seemed quite small, and it was only after it had been struck by a charge of No. 6 shot, and it had fallen into the water, that its real size was perceived. Being but slightly damaged by the fine shot, it swam vigorously; and for some little time there was a considerable degree of excitement—on my part, lest the snake should escape; and on the men's, lest it should attempt to enter the woodskins, as they warily, and quite inefficiently, paddled under the overhanging branches to intercept its course. The Indians at once recognised it as "Haimarara"—"bad, bad snake" they declared; but a good view shewed me that, at any rate as regards poison, it was a perfectly harmless species, and I was thus able to grasp it and secure it, against the most earnest remonstrances from the men. A chance gash which I received from its teeth, while uncoiling it from a branch under water, around which it had coiled on being seized, proved to the men that it was really harmless, though they were at first inclined to believe that I had taken something to prevent snakes from harming me. Though destitute of poison, the reptile was capable of inflicting a very severe bite, and its hindmost maxillary teeth, especially, were very large and curved. Its Indian name is evidently taken from the resemblance of its markings to those of the fish (Haimara), but the dark cross bands are more distinct and paired, and the ground colour is yellowish-brown, not silvery.

Above the Oobaroo, the banks are quite swampy, and

covered with a low forest growth; and the river winds considerably, with etaboos in all directions. About a mile or two above, a large lake-like expanse is passed on the East bank, leading by numerous etaboos into the river; and across this, through a narrow channel, the landing of the Ichiderie settlement is reached. The settlement is quite a small one, not of Accawois, but of Macoosis, with the distinctive round, conical-roofed houses, which here were shut in at the sides by large pieces of bark. It is situated on a high hill, of which a very fine view is obtained further up the river.

This whole upper district, for a very considerable number of miles, seems to be nearly continuous swamp, covered with a low, almost bushy, growth—"Serabébé," it was termed by the Indians with me—most monotonous in its character, but giving a very distinctive facies in contrast with high forest which so completely obstructs the view. Here and there, a flowering water mora, water wamara, or corkwood tree, broke the horizon of green almost uniform except where small hilly tracks rose. These were generally the sites of old deserted settlements. Such are Awiebarie and Wokabouyaqua below the Sarabaroo creek, and Omiaqua and Mosocorie below the Atakapara.

Over the greater part of the course, the river runs with a strong current, narrowing at intervals to from about 15-25 yards, and then again widening out to more than twice that extent, and not infrequently with large lake-like openings at the sides, the greater part of which are said to be uncovered in the dry season. Two such expanses, of very large size, are met with above the Sarabaroo creek, and are known as Enwogo-popa and Monima-popa.

The river seems to be extremely shallow in these reaches ; and opposite the Sarabaroo creek, from what the Indians relate, it becomes reduced in the dry season to mere tracts among sand and gravel banks, over which boats would have to be drawn. Owing to the high water in the district, the courses of the various creeks and etaboos were most difficult to follow, and at the Sarabaroo creek, some 8-10 miles above Ichiderie, and at the Atakapara creek, at about the same distance further on, it often appeared to me as though there were no pathway at all along the creek.

The settlement on the Sarabaroo creek is situated on a hilly tract, about a mile from the river-side, and is made up of about 8 or 9 houses where some 16 people reside. The houses are surrounded by a very flourishing growth of plantains, cassava, sweet potato, yams, etc., but the settlement seems to be decreasing in size, to judge by the number of empty and neglected houses about it.

The settlement on the Atakapara creek is scarcely half a mile from the river, and is now the last in this district, though formerly there were several others considerably further up. There seems to have been a general tendency on the part of the Indians towards migration to the lower districts, and several sets of families seem just now to have concentrated themselves at Atakapara, where they are grouped in three separate places, about a quarter of a mile apart, and together making up a large community. Each of these divisions of the settlement consists of several houses, some of which are of immense proportions both in height and area, though inhabited by but two or three people. One of these

large houses, whose owner happened to be absent at the time, was assigned to us for our use.

In the part of the settlement furthest from the river, where the greater number of houses was situated, it was somewhat of an experience for me to find myself an object of special curiosity—if not of dread—to the younger members of the community, who before we had emerged from the forest, had been engaged in some game, their voices being heard from a distance in a loud, but by no means unpleasant, chant, mingled with clapping of hands and the sound of whistles, etc. My advent was the signal for an immediate stampede, and during the whole of my stay, they were hidden away behind the bushes, evidently peeping, for as I changed places, they dodged about accordingly. Of the older people, some remained to receive us; but the others, and chiefly the women, both young and old, walked quietly and quickly away to the back of the houses.

It was noticeable, however, that on the next day they were much less shy. The younger people, though again in hiding, yet laughed and talked aloud to each other so as to be heard, while a few remained in sight, but always at a distance. Possibly this was the result of my having given a few biscuits and a bright four-penny piece to a sick boy whom I had found the day before in one of the houses, and showing him the details of my bush-knife with all its various parts of saw, file, punch, corkscrew, measure etc., and also the mechanism of the breech-loader and the cartridges, and the use to which an empty cartridge could be put in producing a very loud and clear whistle. No doubt in a day or two, to judge from their increase of friendliness, we should all have been

on very good terms in spite of the bearded face which seemed to be the chief objectionable feature.

A very considerable number of tame birds were to be seen about the different parts of the settlement, but they were chiefly parrots, though a few blue sackies (*Tanagra episcopus*) and two or three species of woodpeckers were noticed. Here also was the most grotesque-looking bird that it has ever been my lot to see. This was a green-winged, blue and red macaw (*A. chloroptera*), whose feet, whether from injury, paralysis or rheumatism, were perfectly useless to it, and the bird lay with one side on the ground, moving forwards by hooking its beak in the earth and pulling therewith, and helped on by its wings which it used as crutches. Now and then, from the more powerful stroke of one wing, it rolled from one side to the other, this being accompanied by a series of hoarse caws, as though it were chuckling at its awkwardness. Its futile attempts to keep pace with, and to accompany a blue and yellow macaw (*A. ararauna*) that waddled, and climbed about the place, were really astonishing.

The spirit of hospitality with which we were received when we entered the first house, where some of the women had betaken themselves, was certainly noteworthy. One woman busied herself in reaching and placing on the ground before us large pieces of cassava bread in a basket and the pepper pot; while another procured casirie which she held out to each one in turn, if it were not passed round. This had been the case also at the lower settlement of the Accawois at Sarabaroo and of the Macosis at Ichiderie; but lower down, more within the reach of civilisation, nothing had been brought out unless one of the party had asked for it. At all the

settlements, I had found the casirie to be very pleasant in flavour, especially when the coarser parts had been allowed to subside—and indeed its bluish-pink colour prepossesses one in its favour—but as to the paiwarrie ! the less said the better, at any rate about the drink made on this particular occasion !

In one of the houses in the immediate vicinity of the one assigned to us, great preparations had been, and were being made, as I found on the evening of arrival, for a paiwarrie-drink on the next day. Three large corial-like troughs and several stone-jars and stoppered cassava vessels, were filled with the liquid, and the women in the house were constantly pouring out, mixing, pouring back, and adding fresh liquor from the pots on the fire. Only a small quantity of the cassava had been chewed, and this it seems is generally the case, the boiling being evidently found to be a much more expeditious way of preparing the drink, though productive of an inferior article.

Early next day, the drinking had begun, but there was no special ceremony about it. The men lay in hammocks, or sat about singly, or in groups, and the women, with few exceptions, without intermission, carried the drink to one after another, in large calabashes which were drained before being returned. The women at intervals, after having made a round, themselves drained the bowl. Certain men, who possibly were known to be great drinkers, and were therefore more favoured on that account, were much more frequently tended than the others, and these were the very ones who at frequent intervals gave vent to the most noisy eructations—the sounds of which appear to be a constant accompaniment

of the early stages of the drinking, Later on this seems to give place to actual vomiting in proportion to the quantity taken, and repeated with successive potations, as we found to our cost during the succeeding night, when one of the Indian huntsmen who seemed at least to equal the greatest drinkers of the settlement, constantly, in spite of repeated protests, came in the near neighbourhood of our house to disgorge, thus relieving, and at the same time fitting, himself for further draughts.

Now and then a few clapped their hands, at the same time stamping and bursting out into a sort of chant; but there was only a running chaff with frequent laughter during the greater part of the time. This seemed to be at its loudest when, on entering the house, I either refused the drink or but touched it with my lips after having once partaken of it, while the women still held it to my lips as though to compel the draught. Their proceedings were evidently most irregular, owing to our presence, and the distractions which we introduced, evidenced by their breaking up at intervals to watch the catching of butterflies with the net, the shooting of woodpeckers in the trees around with the breechloader, the placing out of the prepared specimens in the sun to dry when the rain held over, and more especially the skinning of birds by the taxidermist—seeing us off when we set out in the morning to shoot beyond their cassava field, and later on when some of us started for the higher part of the river.

The cassava field was of enormous extent, and plantain, banana, yams and sweet-potato, were scattered about it. Large macaws and the quow-birds were

heard in the forest around, but only one of the latter was obtained. At the settlement itself there was little to be had except the commonest of Indian utensils and fittings. A fowl and some babracoted haimara were bought, and this but incited an offer of eggs, which, to my extreme disgust, turned out to be in an advanced stage of incubation.

It was amusing to study the numbers that gathered along one side of the house at various times during the day, and especially during breakfast and dinner, when they sat and watched the process of eating. Evidently, the spoons, knives, forks, plates, etc., were new to many of them. With the exception of two of the men, they asked for nothing, however; and when something had been given to a few of the party who then departed, the others only waited as though for their own turn. One of the men who had been at a wood-cutting grant, and who spoke a little English, made himself a perfect nuisance, and when but scant courtesy was shown him, made attempt to retaliate by asking for rent of his house. As the day before, on our arrival, we had been given the house because the owner was absent, I was able to deal with him satisfactorily, and on informing him that the woman who had assigned us the house would receive a gift, he fortunately rid us of his presence for the rest of the time. The other man, with but a few words of English at his disposal, wanted a little of everything that he saw; and but for a casual drink of quinine, for some of which he begged on seeing me take it, he might have been even a greater nuisance. As he saw me toss mine off at once, he did the same, on my representing it, to the dose that I gave him in a little water, and luckily

this proved sufficient, for he never came back to ask for anything more.

During the evening, while the paiwarrie was being finished, there was a more or less continuous, monotonous chanting, which we in vain attempted to stop by singing boating songs at the top of our voices : but before midnight, it was all over, and only the occasional departure of our huntsman from the house, groaning as he went out, under the action of the paiwarrie, disturbed the quiet of the night.

It was not surprising to me that this man had become so upset, for during the day he had literally swilled himself with the drink ; and quite early when we started for the upper district above Atakapara, he had been left behind, being considered unfit to be carried in the woodskin.

The district around the settlement is but slightly raised above the general level, and when the river and the creek are swollen to their highest extent, a great part of it must be under water. Along the river, the same condition prevails, and the swamp is covered with the same low growth that characterises it lower down. The sites of old settlements, such as Korokong, Tapaquia, etc., are met with in the neighbourhood of various openings and creeks, but they are now quite overgrown, the landings only being more or less distinguishable. On the East bank, some miles above, the growth becomes quite bushy and sparse, and grassy land begins to line the waterside, and this savannah-like character is found until the Morokparoo creek is reached, at about some six miles from the settlement, and on the East bank.

At the mouth of the creek, the river opens out into a large lake-like expanse, quite shallow, and evi-

dently quite uncovered in the dry weather. This expanse continues along the opening of the creek for some distance, and would lead one, from its width, to conclude that it was the course of the main stream, which here had changed from its general north-western direction to due West; but it suddenly narrows further on, and continues by a very winding course in a small channel. The opening of the river into this pond, on the South side can scarcely be distinguished, for it is but a few yards in width; and is almost hidden by the higher growth on the south-western border. The channel is entirely tortuous for some little distance, and remains quite narrow, except where it curves round after a long reach, and then opens out to a width of about from 20-25 yards, and now and then with an occasional larger expanse. Higher land can be distinguished in the far South, but apparently at a considerable distance from the waterside. Numerous tacoobas, or fallen trees, lay across the course, from which, however, we experienced but little inconvenience since the swollen state of the river gave the chance of an easy passage.

It would have been extremely interesting, and withal desirable, to have followed out the further course of the river, but considerations of time and provisions forced our return to the village of Eneyudah, whence I intended to make an expedition to the Maboороо mountain, which attains its highest elevation about midway between the Demerara and the Essequibo.

Earlier in the trip, an attempt had been made to reach this point, in spite of the warning of the Indians that the creeks were full ("the creek swell," said they)

and therefore impassable ; and it had been with difficulty that we had persuaded four of them to accompany us as guides and huntsmen. Report said that the three large species of macaws, the rare species of chatterers, the cocks-of-the-rocks, and other uncommon birds, mammals, etc., were to be obtained on the mountain, and therefore a special attempt was made to ascertain the truth of the report, and the advisability of making a camp there, for a week or two, to procure specimens of the various forms.

As the Indians had reported, however, so we found, that it was out of the question. The small creeks that usually were crossed by a short tacooba over a narrow channel, had, by the recent rains, become great rivers, spreading over the whole valleys between the hills, and were of various depths. Four of these were passed in which the water at different parts varied from up to one's thighs to up to one's mouth. The fifth, which was a part of the lower Maboaroo creek, was more serious. Here a valley of about a quarter of a mile in width, and with steep banks, was taken over with water, in which one got out of one's depth quite at the edge ; and as the path ran along this valley for a great distance, the amount of swimming necessitated would have been out of the question considering the various packages, etc., that were being carried, and which it was essential should be kept untouched by water. Four other such creeks were said to be ahead, and from arrangements made we would have to return the same day and repass the whole set ; while to cap it all, the Indians, who alone knew the track, declared that they could not go on. We had been compelled therefore to abandon the attempt.

A peculiarly interesting feature of the flooded valleys had been the various small forms of air-breathing animals, which usually inhabited the ground or secured themselves under the vegetable débris on the surface, and which, by the rising of the water, had been compelled to take refuge on the trunks of the large trees or in the foliage of the small undergrowth of the forest. Among them were curious forms of small lizards and snakes, grotesque and strangely coloured little frogs, antique-looking and repulsive myriapods—such as *Spirobolus*, *Polydesmus* and *Scolopendra*—and a very miscellaneous assortment of insects and arachnids, the more noteworthy of the latter group being splendid specimens of the large bush scorpions and spiders, some of the latter being especially large and richly coloured, together with the very uncommon so-called scorpion-spider or “ting-ting” (*Phrynus reniformis*), which, though it has a remarkably bad name among the forest people as causing certain death by its bite, could hardly cause more than severe pain and discomfort, except in cases where the subjects are diseased, and are thus either frightened to death or are killed by blood-poisoning induced by the bite.

Of many of these forms, specimens were obtained, and, in not a few cases, with a considerable degree of care, since, with the idea of keeping my clothes dry, I had in each instance waded through the creeks *in puris naturalibus*, a hat and a pair of shoes and socks making up my attire. When a futile attempt had been made to catch a scorpion or centipede, and it had fallen into the water in which we were standing, often more than waist-deep, the few next moments were by no

means the most pleasant I have ever experienced, even though I stood well against the current.

On the occasion of the former attempt, the rain had been falling heavily for some days, culminating in a downpour of unusual severity the night immediately preceding. Now, on the return from the higher part of the river, though rain had fallen nearly every day, it had been much less heavy, and the creeks were pronounced by the Indians to be "not too full." An early start was therefore made, three of the Indians of the former journey again accompanying us, and four of the men carrying provisions and hammocks, that we might spend the night on the mountain.

We had scarcely entered the forest outside the village ere the rain came down, and it continued throughout nearly the whole day, varying at times from a heavy downpour to a gentle shower. The track was by no means clear, and the two younger Indians were not infrequently puzzled as to its exact course, some little walking in various directions being occasionally necessary to decide it. The valleys and creeks that previously had been so swollen, were now almost quite clear, and large tacoobas gave a right of way, dry, over the channels. The varied Fauna that had characterised the trunks of the trees and the low bushes, on the former occasion, was now hidden away in its many haunts; and but a few beetles, cockroaches and myriapods rewarded the trouble of turning over, or breaking up, the old and rotten wood on the forest floor. Various branches of the Maboороо creek were passed, and then the main creek itself, where an immense tacooba crossed the wide and deep channel, at the bottom of which a small body of water

ran with strong current towards the lower lands by the Demerara river.

The ascent was extremely gradual, the track skirting round the sides of the hilly ranges, and but seldom going up and down directly. Great forests of mora and green-heart were passed through, where the low undergrowth consisted chiefly of the young plants of the same species, and here and there trysil, purple-heart, crabwood, etc., were seen by no means sparsely. The last two creeks met with, at a short distance apart, are in reality mountain streams rushing down a steep incline over a rocky floor, murmuring as they run, and the mountain itself rises sharply from the very bank of the second of these streams; but the ascent is nowhere arduous, though very steep towards the very brow of the elevation.

The distance of the Maboaroo mountain from the Demerara, as mapped, gives about seven miles; but the winding Indian track and the elevated parts of the course, nearly doubled the distance; and it was not until after about five hours had elapsed that we reached the highest point, the luggage having been deposited by the stream at the base.

From the top the view is extremely fine so far as one can get it, but it is only through the openings of the trees which grow to the very edge of the perpendicular face of the hill, and project over it, that one can obtain partial glimpses of the district which lies between the Demerara and the Essequibo. The day, too, from the amount of rain, was very misty, and the scene was much obscured thereby.

Away, as far as the eye could reach, stretched the immense undulating plain of forest, with wide ridges

and valleys close at hand, and hills and mountains rising on all sides in the distance, the rich and varied colouring of the tree tops close below, contrasting strikingly with the blue tints which lay over them afar, where, scattered over the scene, and lifting and shifting at short intervals, patches of misty clouds hovered like fading smoke-columns, or lay bathing the valleys. Gleaming like a mass of silver in the sea of green, the waters of the Essequibo could be distinguished, apparently not far from the mouth of the Potaro, where a bend into an open valley in the line of sight revealed it, though hidden at short intervals by the shifting mist. On the North, the clear outline of Arrisaro ran, with its gradual eastern rise and its steep and sudden descent on the West, distinct against the mist in the valley beyond; while Oomiah, Yaya, Canarook, and other mountains could be distinguished at varying distances, though at times obscured by the mist which thickened as the day wore on.

Beautiful as was the scene, it was yet a disappointment to me. Justifiably or not, I had been led, by report, to picture, on the top, a bare and arid rocky area close to the edge, with a sudden and perpendicular escarpment of the greenstone rock, of which the mountain is composed, where from its height of more than 800 feet, the whole country below would be spread out like a vast panorama before one's uninterrupted gaze; whereas, in reality, it was wooded to the edge, and one could view the scene but in sections at a time. By climbing out on to one of the larger trees that projected nearly horizontally over the precipice, I was able to secure a fairly complete view of the whole extent, and at the same

time to note the forest-covered talus at the foot of the precipice, but one's attention was more or less drawn to the peculiarity of the position, and to the possibility of the tree being uprooted from its rocky floor—which was, however, pretty well beyond the range of probability. A sudden swaying of the branches which I held, under a chance side pressure of my weight, as I glanced down, gave me a momentary tremor which I believe will be one of the most lasting impressions of my life, and caused the heart to beat for some little time in a way I had never previously experienced.

The rain which had accompanied us thither, again descended, even as we left the top of the mountain; and we slept at the base, with the mountain stream babbling in our ears, and the rain drops beating upon the trees. Throughout the night and the next day, the weather continued thus unfavourable, and indicated that the hope of making a collection of specimens was but a forlorn one.

Besides the hair and bones of a sloth—the remains of the feast of some wild animal—and a spider monkey, high up in the trees, swinging himself along out of range, nothing else noteworthy was seen; and but the loud whirl of a maam (*Tinamus*) in flight, or a chance cooing of a wood dove afar, nothing else was heard but the pattering of the rain drops overhead. The great macaws, the cocks-of-the-rock, the rare chatterers and other forms that frequent the mountain, were hopeless objects, and the Indian huntsmen put it all down to the rain: and doubtless they were right. The same cause had hindered our work, and hampered our movements continually, and had made the creeks so swollen, that poisoning with haiari, which

I had bought for the purpose, was out of the question ; and now there was nothing to be done but to return homeward, shaking, not the dust, but the water off our feet, on the district that had treated us so badly.

In a future paper, I hope to be able to summarise the chief results of the expedition, with some other results previously obtained.

Occasional Notes.

By the Editor.

The discovery of Seed and Seedlings of the Sugar-cane in Barbados.—The case of the actual proof and the general recognition of the fact that the sugar-cane produces fertile seed—a result brought about by the work of Mr. J. B. HARRISON, M.A., of Christ's College, Cambridge (late Island Professor of Chemistry in Barbados and now Government Chemist of British Guiana) and Mr. BOVELL of the Dodd's Reformatory, Barbados—well illustrates the uncertainties that often attend the scientific worker in the public recognition of his work, as well as the disadvantages under which such workers labour in the smaller colonies, away from the great European centres of learning, and the great Societies, at whose meetings they might personally record the results of their work.

More than two years ago by their experiments, Messrs HARRISON and BOVELL were led to the opinion, previously stated by other observers, that the sugar-cane not only produces seed, but *fertile* seed; and it is now eighteen months ago that the results of their experiments, which had been carried out on a scale, and in a manner, that placed the fact beyond doubt, were made known. Since then, confirmatory of their work, the seeds have been sown by other individuals and have germinated, and the seedlings have even been planted out and raised. Spikelets of fertile seeds, and germinating seeds and seedlings preserved in glycerine, were distributed by the investigators to various institutions and individuals—and canes grown from some seedlings for-

warded to the Botanic Gardens of the colony, are now so far advanced, that an analysis has been made of one of them and the results published.

Among other individuals, and by special request, Mr. D. MORRIS of Kew Gardens was supplied with spikelets containing fertile seeds, and germinating seeds preserved in glycerine. These, or corresponding examples raised by him from the seeds supplied, were figured and exhibited by him at the March meeting of the Linnean Society—and the next that is seen of the matter is the ascription of the discovery of the cane seed to Mr. MORRIS by some of the most influential of the Home journals and papers, as the result of the Linnean meeting. Meantime no attempt seems to have been made by him to contradict the false ascription in the journals referred to; and science workers in the West Indies who are familiar with the facts of the case, are wondering when justice will be done to the work of the colonial investigators.

A long chapter might be written on the history of the subject, for several individuals, at various times, and in various parts of the world, appear to have noted the production of seed by the sugar-cane. The earliest of these observers seems certainly to have been Mr. J. W. PARRIS, as related by the *Barbados Agricultural Reporter*, and the *Liberal*, 1859.

The *Sugar Cane* (June 2nd, 1890) is responsible for the statement that Mr. ALFRED FRYER, "having heard in Antigua a tradition that the cane had formerly been grown from seed, brought seed to England (about 1872) and handed it to the authorities at Kew, who successfully endeavoured to raise plants from it." Possibly this

should have been "unsuccessfully;" but, in either case, there seems to be some mistake in the matter, for it would scarcely have been so positively and barely stated in the *Kew Bulletin* for December, 1888 (No. 24) that "certainly in the rich Herbarian at Kew there are no seed-bearing specimens," if at the time there were actual seeds there—for, presumably, specimens of them would have been preserved.

Contemporaneously and independently, the late Dr. SOLTWEDEL appears to have attained the same results in Java, that Messrs. HARRISON and BOVELL did in Barbados; and excellent figures are attached to the report in which these investigations have been published by Dr. F. BENECKE. The special credit is, however, due to Messrs. HARRISON and BOVELL that it was through their work that the matter is now regarded as definitely settled, and general recognition given to the fact that the sugar-cane produces fertile seed.

With the history of the matter, as touched upon above, before one's mind, it becomes almost comical to read in the last issue of the *West Indian and Commercial Advertiser* (June 1890)—a magazine in which one ought at least to expect some credit for good work done in the West Indies—"There is no doubt as to the value of the experiments successfully conducted by Mr. MORRIS at the Royal Gardens, Kew, in the obtaining seeds from the Sugar-cane. Practical men agree that it is impossible to over-estimate the value of the discovery made by Mr. MORRIS."

Luminous Larva.—On page 108, a description has already been given of some luminous larvæ, obtained

along the higher part of the Demerara river, and referable to species of *Lampyridæ*. Through the kindness of Mr. W. F. BRIDGES, who forwarded me a specimen from the Berbice river, I have been enabled to examine another luminous larva, referable to the *Elateridæ* or spring beetles, and commonly known as the Labarria Seh or Labarria worm among the Indians, who are said to consider it as being as venomous as the labarria snake, though the little grub is really a perfectly harmless object. The same, or a closely allied species has already been briefly referred to in the pages of this Journal (*Timehri*, 1888, p. 319) by Mr. H. I. PERKINS, who found it in association with the large "three lights" fire-fly (*Pyrophorus*) in the Puruni district. The luminosity of this form, when it is observed in a dark place, is singularly striking and beautiful. The light is emitted along the whole length of the body—the head, the front part of the anterior segment, and the last segment of the body, being altogether luminous, while each intermediate segment gleams from a small area on each side of the back, two regularly arranged rows of golden brilliants being thus observable. The light is continuous, and very bright, but it is intensified when the little creature is irritated. At intervals, one or more of the dorsal lights will be observed to be very dull or nearly extinguished, but apparently they are never quite put out,

Presentation to Charles Edmonstone.—I am indebted to Mr. RODWAY for the facts of the following note, which will be of interest in relation to the article on WATERTON and his Demerara friend. When EDMON-

STONE left Guiana in 1817, breaking his connection with the colony, of which he was then Keizer and Financial Representative, the inhabitants, in appreciation of his value and his services, subscribed to present him with a piece of plate; and the following inscription was written by WATERTON for it:—

A TOKEN OF GRATITUDE
from the Inhabitants of Demerary
TO
CHARLES EDMONSTONE, ESQ.,
whose integrity, and many excellent qualities,
during a residence of thirty-seven years in the Colony,
gained their sincere esteem:
his prudence and humanity, entitled him
to the command of repeated expeditions, against the
revolted negroes of Guiana;
and his courage, always ensured success.

Cacao and its Insect Pests.—In a former number of *Timehri* (Vol. I, New Series, p. 352) in an occasional note on this subject, I was enabled, through the kindness of Mr. WILLIAM SMITH and the late Mr. BOSCH-REITZ, who submitted specimens to me for examination, to describe two Longicorn beetles, *Stirastoma depressa* and *Tæniotes farinosus*, which were productive of serious harm to the cacao trees in Surinam, and less seriously so to those in Essequibo. Recently through the kindness of Mr. ELI VAN PRAAG of Paramaribo, I have had the opportunity of examining some minute Scolytid beetles, which have only been known to attack the cacao plants within the last year, but which had already been the cause of death to the plants over a very considerable area of plantations in

Surinam. The beetles were submitted to Mr. C. O. WATERHOUSE, the Coleopterist of the British Museum of Natural History, who has kindly informed me that the "majority of them are the now well known *Xyleborus perforans*—WOLLASTON, described by him as *Tomicus perforans* from Madeira=*Bostrichus testaceus* of WALKER from Ceylon=*Xyleborus affinis* of Eichhoff from Cuba, N. America, Brazil, etc., etc."

This little beetle is a serious pest in a variety of ways, two extreme cases being the damage of beer casks in India, and the destruction of sugar-cane in St. Vincent, West Indies. It has not, up to the present, been recognised in Guiana as being destructive to the cacao, but in the dead and hard wood of various trees, in the swamped land above the Great Falls of the Demerara river, I have found them in considerable quantities.

The first stages of their method of attacking the cacao are not yet ascertained—the cases not having been really studied; and this is essential before any really effective steps can be taken for protection. When the trees begin to fail, their young shoots and the branches are found to be simply riddled through and through with perforations, and stocked throughout with the adult beetles and their grubs in various stages.

A Fungus-covered Moth.—A most interesting case of fungoid growth was lately brought under my notice by the Revd. HENRY TAYLOR of the Upper Berbice River. This consisted of a large Sphinx moth, *Dilophonota ello*, which was covered throughout by the mycelium of a fungus, the hyphæ having taken over the entire substance, and grown out from the outer covering layer

into numerous prickle-like erect processes along the course of the body, giving it a most peculiar appearance. The object thus appears to be a pale yellowish-brown fibred insect, provided with numerous processes. The *Saprolegnia* usually attack dead flies, etc., but in this case, from the position on a tree where the moth was taken, it would seem to have been attacked before death—possibly during injury or disease. The specimen was forwarded from the Wieroonie district, where the cassava fields of the Indians were, a year or two ago, utterly destroyed by the caterpillars of the above-named moth, several of which were sent to me by Mr. TAYLOR for identification.

An internal Parasite.—A case that seems worthy of mention, of the occurrence of the Small Thread Worm (*Oxyuris vermicularis*), was quite recently submitted to me through Mr. VAN PRAAG of Surinam. The little parasites were from the rectum of an infant about three months old, and they were found to exist there in astonishing quantities. It was a peculiar feature of their occurrence that they were all males—at least the chance ones taken for examination and submitted to me were all males: but it may well be that to the untrained eye, the differences between the sexes, so clearly marked though they be, were not recognised when they were being picked out from the mass.

Whip-worm.—An extremely large Gordiaceous worm occurs in the upper waters of our rivers, where it is found lying in the sand or mud, coiled up in an almost

inextricable manner. The creature which is about a foot or more in length, and about a line in diameter, presents a striking likeness to a piece of brown leather shoe-string. It tapers off gradually towards one end where the mouth is situated, furnished with a minute fringe ; but the hinder extremity is blunt, and there is no opening for an anus. It appears to be composed solely of an outer firm cuticular layer which is faintly transversely striped, and of a softer central substance, in which no details of structure have been made out. At intervals it will be observed to very slowly wave the anterior part, twisting and twining about the coils or knots of its body ; and when disturbed, it will often perform these movements in a comparatively vigorous manner.

The creature is generally looked upon as some curious kind of snake, and it was once brought to me by an ignorant man as being identical with the species of asp that was the cause of CLEOPATRA'S death. It is almost needless to say that the worm is perfectly harmless. Its allies are parasitic in various forms of insects, such as dragon-flies, grasshoppers, bees and butterflies. These forms, however, are of very small size, and are commonly known as hair-worms, being but pigmies when compared with this giant.

Any notes as to the wider occurrence of this form, or as to its habits and the details of its life history, will be gladly received from those who may have opportunities of observing them.

Leaf-winged Locust.—Of all the many varied and really wonderful contrivances to be met with in Nature tending towards the protection of various harmless

creatures which are preyed upon by other forms, perhaps none are as wonderful as, certainly none are more remarkable than, the condition of the anterior pair of wings in certain of the *Locustidæ*, such as *Pterochroza* and other closely allied forms. In many genera of the family, the front wings are elongated and narrow like the wings of the grasshoppers, and are not only coloured green like the ordinary leaf of a plant, but are furnished with a large subcentral vein like the midrib of a leaf, with small veins springing therefrom. In *Pterochroza* and the other special forms referred to, of which a few different examples have lately been added to the Museum collection, the leaf resemblance is carried to a most perfect degree. In shape they are ovate; and generally, as in the common elm leaf, the one side is somewhat wider than the other, according to the depth of the curve of the central vein, which is thickened like a midrib. From this, side veins pass off in all directions, branching and reticulating, exactly as in the case of the leaf of an ordinary dicotyledonous plant. The colouring of the wings is even more remarkable, the tint varying according to the species. In one, the shade varies from reddish-brown or reddish-yellow to a dull purple, and closely resembles the shades to be found on the young leaves of many of the forest trees, and more especially on the mora (*Mora excelsa*). In another, the tint is of a deep green, which is said to fade away gradually on continued exposure to light after the death of the insect. In a third, it is of a very pale yellowish-brown, much like the colouring on an old and fading leaf about to fall from the plant; while, in a fourth, it is a dull, dead brown, like that of a sere and fallen leaf.

As though to give a more complete naturalness, to the already seemingly quite natural leaves, variably sized spots of brown or yellowish-white are sparsely scattered about the surface, just as are to be found so commonly upon leaves.

Observations upon the growth, life history and habits of these forms, are much needed ; but the specimens seem to be extremely rare—though it is much more likely that, inhabiting the foliage of trees and bushes, they are seldom, and then only accidentally, discovered. It is suggestive that the forms in the Museum were only obtained when they had strayed into houses, in or by the forest, on the Mazaruni river.

New animals in the Museum.—Within the past three months, a large assortment of new specimens has been added to the exhibition cases of the Museum, which taken with those added last year, go far towards completing the typical collection of exhibited specimens of the Mammals of Guiana. Of these the great proportion has been due to the warm interest and generous gifts of Mr. JOHN JUNOR of Plantation *Providence*, who, since he learnt the needs of the Museum, has been constantly aiding in completing a typical series of the Guiana animals. To his public spirit we are indebted for the gift of the tapir, species of deer, the puma, ant-bear, grisons, racoon, jaguarondi, ocelot, fox, otter, kibihee, and many others. The fine ocelot and the magnificent specimen of the jaguar, from the Drill, Mahaicony, exhibited in the case containing the cats of the colony, were obtained through the kindness and public spirit of Mr. B. J. GODFREY and Mr. R. C.

CURTIS, who presented them to the Museum, and gave an unique chance of a proper preservation of the skins.

The Hoatzin.—This most curious of all living birds, the *Opisthocomus cristatus*, commonly known in the colony as anna, stinking pheasant and Canje pheasant, has recently been the subject of considerable investigation, based on specimens of adult birds, nestlings and incubated eggs, collected in Berbice and forwarded to London preserved in strong spirit—the cost being defrayed by a small grant from the funds of the Royal Society through Dr. SCLATER, the Secretary of the Zoological Society of London. Some preliminary notes, with special reference to the functional claws on the pollex and index of the young, and to the pterylography of the birds, have recently been published in the *Ibis*, by Mr. BEDDARD, Prosector of the Zoological Society; an elaborate memoir has been prepared by Professor PARKER, who has termed his subject, the “Reptilian Bird”; while notes on the habits of the birds have been contributed by me for the next issue of the *Ibis*. A detailed notice of the chief morphological and other features connected with the birds, will be published in a later issue of this journal.

The Fin-foot.—This is the common name given to a small coot-like bird, *Heliornis fulica*, usually known in British Guiana as little ducklar, frog-footed duck and narrow-bill duck. It is very common in certain parts, as I discovered in the upper waters of the Abary creek (*Timehri*, 1888, No. xiv, p. 373), where they were

to be seen skimming along the surface, or diving for long distances, and coursing ahead of the boat. They are said to be common also in the water-path of many of the estates. They are of a dark slaty-brown colour above, and grey below, with streaks of white along the head and neck. The bill is sharp, long and narrow. The toes are webbed, but instead of being united to each other, they are free from near the base, the expanded skin being indented opposite each joint of the digits.

As the anatomy and affinities of the bird require investigation, I should be extremely glad to receive, from those who have opportunities of procuring them, adult birds, nestlings and eggs, in spirit, together with notes on the nesting and habits of the birds.

On Snake-poison Stories.—So many tales are told of the recovery of persons bitten by snakes, where such simple and perfectly useless remedies as sugar and onions, salt, parafine oil, etc., have been made use of, that one naturally receives such a story with caution where the additional statement is introduced that the snake was a poisonous species. Cases are to hand, few though they certainly are, proving beyond a doubt the virulence of the poison of the three chief poison snakes of the colony; and after making due allowance for the well-known fact that many animals, and notably the human subject, are often bitten inefficiently owing to a variety of ascertainable causes, there yet must remain the very large proportion of cases of snake-bite, referable to innocuous species.

It has been an ordinary experience, to have common and uncommon, but quite harmless, species forwarded to me to the Museum, under the name of some deadly snake, usually labarria or bushmaster, whose colouring they generally more or less resembled : and bites from them would naturally be tacked on to the poison-snake ; and a cure, from a poison that had never entered the system, would equally naturally be set down to some casual remedy that some one had proposed or believed in. Tending in the same direction has been the experience gained while travelling about the colony, and in conversing on the subject with colonists and natives of various degrees of qualifications for knowledge on the point.

Apart, however, from the ready and unreasoning reference of nearly all snakes, and especially the large or more vicious-looking species, to poisonous kinds, there do exist in the colony certain species of boas and colubrine snakes which so closely in form and colouring resemble the viperine snakes,—characters no doubt due to adaptive and protective modifications—that even one really conversant with the different species, might easily mistake the harmless for the deadly, unless a close examination be made. This is markedly so in the case of some snakes resembling the labarria (*Trigonocephalus atrox*) ; and the statement becomes luminous when it is borne in mind that it is this very species whose bite, undoubtedly fatal in some cases, is often said to be of little moment in other cases, as judged by the results on persons said to have been bitten by it. At the time of writing, there is on view in the Museum a living specimen of a land boa that is and has

been thus deceptive to many. The external characters, less the sub-nasal pits, the supra-ocular plates, and the terminal spine, are closely similar to the labarria, and even the dentition is calculated to mislead one, since the anterior maxillaries are considerably enlarged and re-curved. In fact, unless one were so familiar with the morphological distinctions of the Boas and the Crotaline Vipers as to be able to stand the test of a *viva voce* of an anatomist, by whom he would be required not only to relate, but to point out on specimens, *in situ*, the exact distinctions, there would be every likelihood of these two species being confounded.

Sociable Caterpillars.—Quite recently, through the kindness of Mr. WABY of the Botanic Gardens, who forwarded me a specimen, I had the opportunity of examining a compound cocoon with a set of sociable caterpillars, referable to the Noctua or Owlet moth, *Anomis grandipunctata*, of whose occurrence in the colony there seems to be no previously published record. The extremely interesting and diverse methods and contrivances by which different species of insects secure themselves during the transition from the grub to the chrysalis and imago, are illustrated by a very large series of examples among the more commonly occurring species; but the case here referred to may be considered, perhaps, the most striking and peculiar. Several dozen caterpillars, of about $1\frac{1}{2}$ inch in length and $\frac{1}{4}$ inch in thickness, covered with a short reddish-brown fluffy hair, make for themselves a delicate-looking, but strong, silky case of variable shape, attached to small branches or twigs at its broader basal end, and

coming to a narrow neck at its free end, which is open for the ingress and egress of the grubs. This nest which serves eventually for the sites of the cocoons of the various members of the colony, is apparently used as a refuge or shelter during their earlier life, for long before they have ceased feeding, they will be found to have congregated within at certain times. Later on, the inner walls of the case will be found to be occupied with their packed cocoons, and when the little moths emerge, they break through the outer wall, which thus becomes pitted with the remains of the chrysalides. The moths are of a glossy, pale yellowish-brown colour, obscurely marked with large blotches.

A nest that was received some time ago from a correspondent on the East Coast, was swollen and pear-shaped, or saccate, from the extension caused by the packed cocoons, and was hardly recognisable when compared with the rather flattened nest, occupied by the caterpillars, which was sent from the Gardens.

Four-tailed Lizard.—The form of reptile here referred to belongs to the widely distributed species, *Tupinambis nigropunctatus*, which, with the much larger and rarer species *T. teguixin*, is commonly known in the colony as Salempenta. The specimen was presented to the Museum by Mr. JENMAN, nearly three years ago, in a normal one-tailed condition, and it has since been exhibited in the large snake-case with iguanas, alligators, land boas, water boas, and colubrine snakes of various descriptions, which have been obtained at, and have lived for, different periods. A land boa or camoodie (*Boa con-*

strictor) and a water boa or camoodie (*Euneetes murinus*) have been its constant associates, and it has walked backwards and forwards among and upon these, and the other objects in the case, with perfect impunity during its long confinement. A little more than a year ago, it was noticed that its tail was much bruised at various points—it was supposed to have been thus damaged by constantly striking against the wiring of the cage, though it might have been caused by bites from the alligator, or from rats which were placed in the cage for the snakes, and with which the lizard used frequently to fight—and soon there sprouted out from different points, three supplemental tails, which grew rapidly, so that now one is not much shorter than the original tail. Between these new growths, three other minute stumps are to be seen, and probably the reptile is destined to have its extra tails, twice told.

The two species of *Salempenta* can readily be distinguished from each other. The smaller, which reaches a length of about $2\frac{1}{2}$ -3 ft., *T. nigropunctatus*, has hexagonal dorsal scales, though many of them appear to be quadrangular on the living animal, unless very closely examined; in *T. teguixin*, the scales are oval. In the former species, the colour is a spotted black and gold, the golden tint being extremely rich and bright; in the latter species, the lighter tint approaches an olive shade.

The Wood-slave.—One so constantly meets with the report of the dangerous nature of this little lizard, that it seems worth while to declare, with some insistence, its perfect harmlessness. The expanded and sucker-

like fingers and toes cause the little animal to adhere to any foreign object, which it may touch ; but these digits are quite destitute of poison. Even the bite of the creature would be productive of nothing more than a very slight amount of pain, since the teeth are comparatively small and short. Up to the present time, but one species of lizard, the *Heloderma* of Mexico, has been found possessing a poison apparatus and must therefore be regarded with dread. The commonest of the wood-slaves of the colony, is the *Thecadactylus rapicaudus*, its specific name being derived from the fact that when its tail is broken away, the reproduced part becomes quite swollen and turnip-shaped. One specimen that came under my notice along the Demerara river, where they seem to be extremely common among the trees, the stones, and the thatch of the houses, was nearly 7 inches in length, with a tail more than twice the thickness of the body. Another was a constant resident in the thatch of one of the houses at Eneyudah, where its curious cry "sacka, sacka" was regularly heard ; but I was never able to secure it.

New Birds in British Guiana.—Recently I was able to submit for examination at the British Museum, two species of birds which are new to the Guiana fauna :—

1. *Ardetta exilis*

2. *Malacoptila fusca*.

The former is a small heron, about half the size of the common shypook or chough (*Ardea cyanura*) ; while the latter is a speckled brown barbet, which has been obtained only from the Demerara river.

It is noteworthy that of the *Pipreola whitelyi*, which was recently founded as a new species by SALVIN and GODMAN for a very beautifully coloured bird collected by Mr. HENRY WHITELEY in Guiana, there were two mounted specimens in the British Guiana Museum, which must have been placed there more than 16 years before the species was described.

Gold in British Guiana.—In a former number of *Timehri* (No. xi, June, 1887, p. 136) an Occasional Note was given on the slow but gradual increase of the Gold Industry, and it is but fitting that a record should here be made of its later development. With but scant encouragement, and suffering under great disadvantages, the industry may have said to have progressed by leaps and bounds, as indicated by the returns to hand for the different years. In 1885, according to official returns, 939 oz., were exported; in 1886, 6,518 oz.; in 1887, 11,906 oz.; in 1888, 14,670 oz.; in 1889, 29,327 oz.; and in the first six months of the present year about 27,000 oz., valued at nearly \$500,000, have been already obtained, an amount not far short of the total output for 1889, which in itself had been more than double that obtained in the previous year.

The industry has become a very considerable source of income to the Government, for the royalty (at 90 cents per oz.), within the six months, has amounted to nearly \$25,000; while but the merest nominal expenditure on their part has been entailed.

New mining regulations had been framed some three years ago, but experience has shown them to be altogether inadequate and unsatisfactory; and while the Government,

by their desire to appoint a Gold Commissioner, who would be able to report on the various gold districts, and to advise them in the framing of suitable regulations for its development, have lately shown themselves more alive to their responsibilities, they have, at the same time, shewn themselves to be but little in sympathy with the mining community, since the officer unanimously recommended by that community, and one who, up to the present, may be said to have borne the heat and burden of the industry, has been so far practically vetoed for the Commissionership.

A very noteworthy feature in the growth of the industry has been the perception of the fact, that gold is to be found in paying quantities over large areas of the colony. First in the Puruni and Cuyuni river districts, then in the river districts of the North-West, and now more recently in the Potaro district, the metal has been obtained in large quantities; and it may almost be regarded as certain that the upper districts of the Mazaruni, Esse-qui-bo, Berbice and Corentyne will be similarly productive—in fact there are already indications along the Mazaruni district that it is so, but the distance and the difficulty of navigation and transport are altogether prohibitive of mining.

And herein, perhaps, lies the greatest obstacle to the development of the gold industry. The constant succession of rapids, cataracts and falls along the river courses, and the serious danger of these obstructions in the height of the wet season, render the natural waterway a serious drawback; and the genius of the engineer may be said to be the great hope of the future. Following his tracks through the recesses of the forests, come the

pictures of an advanced and prosperous mining industry ; of the inland settlements and villages, and possibly even cities, with their farms and clearings, where a wider agricultural development may be attained ; and of a trade in timber and other forest products from regions at present untapped ; while the easy access to higher lands will furnish health resorts from the coast ; and the gradual clearing of the land, by lessening the almost continuous extent of forest, will tend to an equalisation of climatic conditions that must have a marked influence in decreasing both the great periodic and constant swamps of the interior.

Already, however, the note of labour-alarm has been sounded, for the rapid development of the gold industry within the last two years, has been the means of drawing away from the sugar estates an appreciable quantity from the staff of labourers ; and with the continued advance of the industry, it is but to be expected that the labour supply of the estates, will be still further lessened. The question is thus a most important one, fraught with grave issues to the material prosperity of the colony, how best to maintain the staple sugar industry in full and vigorous swing, and, at the same time, to provide for and encourage the fullest development of the mineral wealth within our reach.

Report of the Meetings of the Society.

Meeting held on 9th January.—R. P. Drysdale, President, in the chair.

There were 21 members present.

Elections.—*Members*: R. G. Duncan, R. A. Swan. L. Forbes, Revds. J. L. Green and D. J. Reynolds.

Associates: R. Driver, R. V. Macaulay, A. H. Loth, R. S. Cæsar, T. A. C. Maskell, E. N. McDavid, H. J. E. Anderson, W. H. Pollard, J. F. Rose and L. E. E. Anderson.

The President in opening the meeting said that as this was the first time he had occupied the chair since his election, he would make one or two remarks. He earnestly desired that the present year would prove satisfactory, and even more prosperous to the Society than any previous one, and especially that there would be a good attendance at the Meetings. As a Water Street man, he hoped that class of persons would make a better appearance at the meetings than they had done in past years. They would always be ready to consider any suggestions that might be made by any of the members, and give them all due consideration. When any member felt that anything was lacking, or could suggest any improvement to the Society, he hoped he would not hesitate to move in the matter and bring it up for consideration.

The Treasurer laid over the Financial Statement and Balance Sheet of the Society, &c., for 1889, showing a net balance in favour of the Society of \$1,038 07 (annexed). Mr. Conyers said that the amount in hand would all be required during the present year for repairs and painting.

The Royal Agricultural and Commercial Society of British Guiana.—Receipts and Expenditure for the Year 1889.

RECEIPTS.		
To Society's Funds	...	\$ 2,890 35
" Subscriptions—		
Ordinary Members	... \$ 1,851 00	
Country Members	... 438 00	
Associates	... 825 00	
Lady Subscribers	... 45 00	
" Arrear Subscriptions	3,159 00	
" *Rents	82 50	
" Catalogues	2,482 00	
" Interest \$91 63 and Profits	40 32	
" \$76 83 from Hand-in-Hand Insurance Company	168 46	
" Scrip from Hand-in-Hand Insurance Company	76 84	
" Received from the following towards New Fittings for Museum	6,009 12	
Mrs. Williams	240 00	
Jno. McConnell	240 00	
Stewart Gardner	100 00	
Sandbach, Parker & Co.	100 00	
Colonial Company	120 00	
Proprietors Pln. Teymouth Manor	50 40	
Edwd. Geo. Barr	480 00	
Hogg, Curtis, Campbell and Co.	240 00	
Hugh Sproston	48 00	
	1,618 40	
EXPENDITURE.		
By Salaries	...	\$ 2,450 00
" Periodicals and Magazines	...	596 87
Less Newspapers &c., sold	...	51 26
" New Books added to Library	...	545 61
" Advertising, Stationery & Subscription to local Newspapers	...	841 87
Binding	...	350 49
Repairs to Buildings	...	144 38
" Balance of cost of New Extension	...	1,628 62
" Cost of New Furniture & Shelving	...	229 50
" Cost of <i>Timeburi</i> , Two Parts to 30th June '89	...	333 14
Less Sales	...	42 38
" Insurance with Hand-in-Hand Insurance Company—Buildings and Contents \$50,000 at 1½ per cent	...	290 76
" Law Charges in connection with Ridgeway	...	875 00
" Cost of Printing Tariff by Commercial Committee	...	48 00
" Postages, Petty and Reading Room Expenses	...	93 14
" Loss on Sale of \$1,654 41, Hand-in-Hand Scrip	...	198 59
	...	165 44
" Paid towards New Cases for Museum	...	7,861 40
" At Credit of Account for Museum Purposes	...	778 90
	...	839 50
		9 479. 80

* Including hire of Exchange Room \$10.

The Secretary read a letter from the Committee of Correspondence, informing the Society that Mr. G. H. Hawtayne and Mr. W. S. Turner had been respectively elected as Chairman and Vice-Chairman of that Committee for 1890, and also, that the question of the next Local Country Exhibition was under consideration.

The Secretary informed the meeting that the following elections had been made by the respective Committees:—

Agricultural Committee: Chairman, Hon. B. H. Jones; Vice-Chairman, A. Braud; Secretary, G. Garnett.

Commercial Committee: Chairman, J. J. Dare; Vice-Chairman, J. S. Hill; Secretary, G. Garnett.

In the matter of Mr. N. D. Davis's motion for taking steps to ascertain the practicability of inducing the immigration of agricultural labourers from the "Southern States," the mover said he would like to postpone it for two reasons. The first was, that the new Land Laws had not yet been passed by the Legislature, and the second, that he had communicated with Major Walthall on the subject, who had written to the Governor of Georgia for information.

Major Walthall said he had no objection to the postponement, but he would like, with consent of the Meeting, to say a few words in reference to the remarks of Mr. Davis at the last meeting. Although his name appeared in the list of Members present, he had not arrived in time to hear the remarks in question. He presumed that he was the only member of the Society who owed allegiance to a foreign Government, and when people read that he, as American Consul, said nothing, when a reflection was cast on the American people, they would no doubt be surprised. He had no

objection to the proposed Resolution, but he considered the remarks of Mr. Davis as exceedingly objectionable. That gentleman had stated that in the Georgia Legislature, the question of the emigration or extermination of the negro had been put to the vote and lost by a tie. He had read the account to which Mr. Davis referred and took no notice of it. He would simply put it to them whether such a question as the extermination of the negro could possibly be introduced into a deliberative body like the Legislature? There was no question of extermination, except the statement that if they did not emigrate there would be an eventual extermination. Major Walthall then read some extracts from American papers, to show that a great deal of the negro difficulty is caused by reckless talk and stump speeches. He hoped that Mr. Davis would not take offence if he should have unwittingly said anything amiss.

Mr. Davis assured the speaker that he took the remarks in the utmost good part.

The Rev. A. J. Leslie brought forward his motion, of which due notice had been given, to allow Wesleyan Ministers to pay their subscriptions quarterly. Mr. Leslie said that the Wesleyan Ministers were liable to be removed at any time on a short notice, especially in March, when according to the rules of the Society, they would be bound to pay for the whole year, while they only received the benefits of the connection for three months.

Mr. Irwin seconded the motion, which was duly carried, it being left to the Directors to make the necessary Bye-Laws.

In answer to a question of the Secretary, Mr. Davis said that he had no names to propose for the suggested

appointment of Local Secretaries in accordance with Bye-Law, Chap. 3, No. 9, but that the matter was within the province of the Directors.

The Secretary read a letter from Prof. Harrison covering a new Tariff of Fees to be charged by the Government Chemist for analyses. The matter was referred to the Agricultural and Commercial Committees.

The Secretary read a letter from Major Walthall, enclosing a communication from the Hon. J. M. Rusk, Secretary of the U. S. Department of Agriculture, as to corn drying, from which the following is taken :—

The kiln-drying of corn is not here practised to any great extent. It is occasionally done with a cargo destined for a long voyage, and sometimes the corn and cob are dried together for milling purposes. In such cases it is simply a kind of baking process, and I know of no special construction of kilns for the purpose.

For commercial uses, the hot-air process is now getting much favor, as it is said to be more rapid, as well as more effectual ; and various devices are on the market for this purpose, under patents. The one made for what is styled " The Ryder Process" seems to enjoy the most of popular favor ; the hot-air in this, being carried up on inclined evaporators, and the process of dehydration quickly and effectually accomplished. Dryers under Dr. Ryder's patent are manufactured by the American Manufacturing Company, at Waynesboro, Franklin County, Pennsylvania, from which other particulars can be obtained.

The thanks of the Society were accorded to Major Walthall for his trouble in procuring the information.

The *Louisiana Planter* and the *Sugar Bowl* having been forwarded for exchange with *Timehri*, it was left to the Committee of Correspondence to decide the matter.

The Rev. W. B. Ritchie on behalf of the Kirk Session presented two Dutch Bibles which had belonged to the old Reformed Church, stating that they were very interesting relics of the past, being lettered *Kerk van*

Demerary ao. 1788. A cordial vote of thanks was given to the Kirk Session, as well as to the Rev. Ritchie for the donation.

The meeting then terminated.

Special Meeting held on 28th January.—R. P. Drysdale, President, in the Chair.

There were 20 members present.

The President stated that he had received a letter from the Government, inviting the Society to co-operate with Mr. Nevile Lubbock, who was now in the colony, in supporting the Imperial Institute. Mr. Lubbock being connected with that institution, it had been arranged by the Directors to call this Special Meeting to hear some remarks from that gentleman on the scope and aims of the Institute.

Mr. Lubbock then gave an explanation of its objects, in the course of which he stated, that they wished to organise a department of Commercial Intelligence, and he wanted the Society to be the medium of communication between this colony and the Institute. They wanted information from all parts of the Empire as to commercial products and other matters. In the second place it was intended to form and maintain a sample collection of the commercial, economical and industrial products of the colony. He ventured to think that great advantage might accrue to the colony from such exhibits. With the scientific skill at the disposal of the Institute, he had no doubt that many products would be discovered and utilised for the benefit of the colony. Mr. Hawtayne had reminded him that after the Colonial and Indian

Exhibition, the Institute had been presented with a good many of the exhibits from the colony. These would form a nucleus, and he hoped the Society would appoint a Committee to procure what other articles they considered necessary or desirable. He felt perfectly confident that any expense incurred would be repaid by the Government, who would have no hesitation in voting such a sum as would be required. He hoped that the Society would do all they could, so that this colony might not be behind the others, but make such an exhibition of her products as might lead to increased prosperity. In conclusion, he asked if any member wished further information, as he was prepared to answer their questions.

No questions having been asked, the President said he presumed they were satisfied with the information. He thought they would not wish for one moment to be behind hand with regard to other colonies. The Institute, he believed, would be of benefit to the colony, and be better than the Exhibitions, on account of its permanent character. He hoped therefore that they would all do their best to forward the object of the Institute.

Mr. Turner and Major Walthall having spoken in favour of the matter, Mr. Julius Conrad moved and Mr. Kelly seconded :—

“That this meeting approves of the proposition made by Mr. Lubbock, with reference to the co-operation of the Society in furthering the object of the Imperial Institute, and request the Directors to appoint a Special Committee for this purpose.”

This motion having been carried unanimously, the President proposed a vote of thanks to Mr. Lubbock which was heartily accorded.

Mr. Lubbock thanked the meeting for the very kindly way in which they had received him, and listened to, and accepted his proposition. He further mentioned that the Institute would form a kind of club house in which persons arriving from the colonies would find all they required in the shape of information, and means of communication, and in that way he hoped many colonists would be brought together to their mutual advantage.

Mr. Davis asked, as a member of the Colonial Institute, whether the Imperial Institute had any intention of trying to amalgamate the two bodies, as he should object to that. Mr. Lubbock stated that there was no such project at present, but both bodies would work in harmony and be of mutual assistance to each other.

The meeting then terminated.

Special Meeting held on 11th February.—R. P. Drysdale, President, in the chair.

There were 23 members present.

The President not being present at the beginning of the Meeting, Mr. F. A. R. Winter was called to the chair.

The Chairman said he regretted the absence of Mr. Drysdale who, he knew, would have performed the duty of introducing Captain Baker more satisfactorily than he could. He had, however, much pleasure in introducing that gentleman, who represented the Boston Fruit Company, and he believed the object of his coming here was to examine the capabilities of this country for developing a Fruit Industry. The introduction and expansion of that industry in Jamaica was mainly due to Captain Baker and the Company, and if

like results accrued here from his present visit, all should have reason to be thankful.

Captain Baker said that it was generally supposed that he had started the fruit trade in Jamaica, but such was not the case. It had commenced about 1868, and he went there in 1870, when he found the business worth looking after. The progress of Jamaica had really been due to the different Governors, who put every inducement to both growers and shippers. The railway had been extended, and every facility given by the Custom House to the steamers engaged in the trade. The Company shipped about one-third of the total export. The great objection to this colony was the necessarily longer voyage. It would not be safe to calculate on any good result unless they could be carried in seven days. Another thing to be noted was that the kind of bananas grown here would not travel well; not being so even and uniform on the bunches they would be likely to be broken at the base, and when that takes place the fruit ripens and rots very quickly. He had made a trip up the Demerara River, and considered the land there to be very suitable, but did not think much of the East Coast. In Jamaica, bananas and cocoanuts were often planted together; he did not think much of the latter in this colony, but thought there were better prospects for chocolate (cacao). The water facilities here were very good, and carriage would therefore be better and cheaper than in Jamaica. As the right kind does not grow here, they would have to be imported: they can be supplied from Jamaica at £5 per 1000. He did not think any firm would start the business without a subsidy. The first year would be a

blank. The steamers in the Jamaica trade could not do the work, special vessels must be built. The Company were not ship-builders but he did not think there would be any trouble in getting the steamers.

In reply to questions from the members, Captain Baker informed the meeting that the average price per bunch of nine hands in Jamaica was 37 cents to 45 cents ; for three months in the year there was a competition and prices were higher ; 240 to 300 suckers were planted to an acre ; labour was calculated at one man to 3 acres, while manure might be required or not according to the soil.

Mr. Winter then proposed the following resolution which was seconded by Mr. Jacob Conrad :—

“ That this Meeting being of opinion that the opening up of the Fruit Trade with the United States would be of immense value to this country, and having heard from Captain Baker that the Boston Fruit Company, which he represents, would be prepared to place a swift line of steamers upon the route ; this meeting earnestly recommends that the Legislature of this colony should favourably consider the importance of coming to an arrangement with the Boston Fruit Company in order to ensure quick and certain communication between the port of this colony and Boston, or other ports of the United States.”

The resolution having been supported by Messrs. Gibson and Cunningham, it was carried unanimously, and copies ordered to be forwarded to the Governor and Court of Policy as well as the Banana Commission.

The President (who had arrived while Captain Baker was speaking) apologised for his absence at the opening of the meeting, he having been unexpectedly detained, and spoke in favour of the resolution.

After some remarks of Mr. Johnson as to the dilatory way in which the Government had carried on the

enquiry into this matter, a vote of thanks was cordially given to Captain Baker, and the meeting terminated.

Meeting held on 20th February.—R. P. Drysdale, President, in the chair.

There were 14 members present.

Elections.—*Members* : J. B. Harrison, G. W. Perch, E. Bremond and A. F. Ferreira.

Associates : G. Ross, E. P. Fraser, I. A. Wilson, R. S. F. Lambert, D. Anderson, Gerard Hawtayne, C. M. Dance, W. F. Nunn, E. Munro, H. A. M. Burrowes, and Geo. Cendrecourt.

The President informed the meeting that the Directors had proposed Mr. Nevile Lubbock as an Honorary Member of the Society, his election being left over until the next meeting in accordance with the rule.

The Secretary stated that the Directors had appointed the following gentlemen to form a Committee to co-operate and correspond with the Imperial Institute, and to be called the Imperial Institute Committee, which appointments received the approval of the meeting.

His Excellency the Governor, the Right Hon. Viscount Gormanston, Chairman; President, R. A. and C. Society, R. P. Drysdale; Vice-President, Hon B. H. Jones; Chairman of Agricultural Committee, Hon. B. H. Jones; Vice-Chairman, A. Braud; Chairman, Committee of Correspondence, G. H. Hawtayne C.M.G.; Vice-Chairman, W. S. Turner; Chairman, Commercial Committee, J. J. Dare; Vice-Chairman, J. S. Hill; Chairman, Planters' Association, Hon. A. Barr; No Vice-Chairman; President, Chamber of Commerce, Hon. A. Barr; Vice-Presidents, A. Weber and W. H. Sherlock; Government Chemist, J. B. Harrison; Government Botanist, G. S. Jenman; Curator of Museum, J. J. Quelch; Thomas Daly, Secretary; with power to add to their number.

The Secretary read the Report of the Librarian for 1889.

In the matter of the Supplementary Catalogue referred to in the Report, it was decided that such a Supplement should be prepared and printed at the lowest possible price.

Mr. Davis called attention to the fact that the vote of \$576 00 for new books had been exceeded during the past year, and stated the necessity for keeping within the estimate during the present year, so as to be able to provide funds for the necessary repairs to the Society's buildings.

Mr. Davis moved the adoption of the Treasurer's statement which had been laid over at the last meeting, which being seconded by Mr. Winter was carried unanimously.

In the matter of Mr. Davis' motion, of which notice had been given at the meeting in December, 1889, for "inducing the immigration of agricultural labourers from the Southern States," the mover asked to be allowed to modify it. This being granted, Mr. Davis made the new motion as follows :—

"That a Committee of Members of this Society be appointed, in order to take steps to make known to the outside world the advantages which British Guiana offers to agricultural labourers, as a country where Crown lands can be acquired on easy terms."

Mr. Davis said that if a number of gentlemen would take up the matter earnestly, they might get a few hundred labourers from different parts of the world to come here and settle. It would be to the advantage of everyone in the colony to have an increase of population, which meant increase of trade and development of every industry. The Society would justify its exis-

tence by advocating a scheme for colonisation, as one of its main objects was to do everything possible for the improvement of agriculture.

Mr. Jacob Conrad in seconding the motion said that he believed this to be the first time that a motion had been brought before the Society which came near to carrying out its declared object. There was no doubt that such colonisation would enhance the wealth of the country, and he would say, undertake it by all means. He firmly believed that the time had now arrived when people might be induced to come and settle here.

Major Walthall said that he had no objection to a Committee inviting Africans from the Southern States, nor did he object to the original motion, but only to certain remarks made with its introduction.

Mr. Bayley said he quite agreed with the motion, and if the matter could be put into a practicable shape, immense good would result. If such people could be brought here they would be consumers of everything, which the present class of immigrants were not. Before bringing these people it would be necessary to make some provision for them, and it would devolve on the Society to formulate a scheme and put it before the Government.

Mr. Winter supported the motion. He considered that if a proper scheme of colonisation could be formulated by the proposed Committee, no Government could withhold their support from it.

The motion having been duly carried, the following gentlemen were appointed on the Committee, with power to add to their number :—

President, R. P. Drysdale ; Vice-President, Hon. B. H. Jones ; Secretary, Thomas Daly ; Treasurer, F. A. Conyers ; B. S. Bayley

S. M. Bellairs, F. W. Collier, Jacob Conrad, J. S. Da Costa, N. D. Davis, A. R. Gilzean, Jos. Monkhouse, Revd. D. J. Reynolds, T. J. Wakefield, Major W. T. Walthall, F. A. R. Winter, G. W. Rockliffe.

Mr. Jacob Conrad referred to the premium of \$50 00 offered by the Society last year for a corn kiln, and stated that he had found out where a proper dryer could be obtained, and that he would bring forward the documents at the next meeting.

The thanks of the Society were accorded to Mr. J. R. Love for a copy of the book entitled, "Free Town Libraries," by E. Edwards.

The meeting then terminated.

Meeting held on 20th March.—R. P. Drysdale, President, in the chair.

There were 18 members present.

Elections.—*Honorary Member*: Neville Lubbock.

Ordinary Member: L. B. K. Collins.

Associates: C. B. Evans, C. G. H. Davis,

Allan Myers and A. Chardon.

The Secretary read a letter from the Secretary of the Agricultural Committee, in reference to the scale of fees of the Government Chemist, which had been referred to that Committee. They were of opinion that "this is entirely a matter of arrangement between whoever may wish to have analyses so made, and the Analyst."

The President mentioned that Mr. E. G. Barr had declined to accept the office of Resident Director in London, and proposed that Mr. Neville Lubbock be elected. While in the colony recently Mr. Lubbock had taken very great interest in the Society as well as

the colony generally, and he thought they could not do better than appoint him.

Mr. Hawtayne seconded the proposition, which was supported by Mr. Davis and carried unanimously.

The Secretary read a communication from J. P. McLaren touching the growing of rice and offering his services therefor. The matter was referred to the Agricultural Committee.

The Assistant Secretary laid on the table some samples of dried bananas, whole and sliced, to which he invited the attention of the members as a probably new industry. He had been experimenting with different varieties in various ways during the last two months, and considered the result as satisfactory so far. The larger varieties took too long; the kind shown was that known as the "fig." They lose 75 per cent. of moisture in drying, and take four or five days, at a temperature of 120 deg. to 150 deg. F. The samples had been dried on wooden laths placed on a bed of hot sand. There was no doubt that sales could be made, for it was very difficult to get anything of the sort that could be sent from the colony without bottles or other troublesome packages.

Messrs. Hawtayne, Vyle and Davis spoke in favour of the experiment and were of opinion that it was the germ of a new industry.

Mr. Vyle gave notice of motion, that the sum of Fifty Dollars be granted from the funds of this Society to Mr. Rodway, for further experiments in producing marketable samples of dried bananas.

Mr. da Costa suggested that an apparatus for fruit drying should be imported.

A vote of thanks was accorded to Mr. Rodway for his trouble in making the experiment, and bringing the matter before the Society.

Mr. Davis exhibited samples of tobacco grown in the colony by Mr. Farrants, of Pln. *Eliza & Mary*. Not having been cured properly it was not marketable, but otherwise the leaf was of fair size, and capable of being made into some article of commerce.

Some discussion took place, in the course of which it was stated that cigars had been made from tobacco grown in the colony, and that they were very good.

The thanks of the Society were accorded to Capt. Smith of the R. M. S. P. Co's service, for a copy of C. E. Taylor's "Leaflets from the Danish West Indies."

The meeting then terminated.

Meeting held on 17th April.—R. P. Drysdale, President, in the chair.

There were 13 members present.

Elections.—*Members*: C. G. Parnell and D. E. Sharples.

Associate: E. L. Donnelly.

The Secretary read a letter from the Agricultural Committee recommending the Society to request the "Government to assist Mr. Jenman in every way in his efforts in the propagation of canes from seed."

Mr. Jones, as Chairman of the Committee, said that the matter was one of great importance. It was generally known that since last year Mr. Jenman had succeeded in growing canes from Barbados seed as well as from flowers gathered in the colony. Those who knew the Gardens knew also that the portion devoted to cane-

growing was extremely unsuitable, the drainage being bad and the land too low. He felt certain that if the Government were approached they would grant a piece of land in some more suitable locality, or ask the proprietors of estates to give portions of land for experimental purposes. He would do his best to assist Mr. Jenman and he felt sure that his brother planters would come forward if the Government would provide the necessary funds. The experiment was yet in its infancy, and it would be for those conducting it to decide on and select the best varieties of the seedlings. He thought the Society should take up the matter, and he would propose a motion as follows:—

“That this Society recommends to the Government the advisability of giving Mr. Jenman, the Government Botanist, greater facilities for growing canes from seed than he possesses at present in the Botanic Gardens, and would also recommend the Government giving Mr Jenman a more suitable piece of land and sufficient funds to enable him to carry on the experiment to completion.”

Mr. Jacob Conrad seconded the motion, which was also supported by the President and Mr. Winter, and duly carried.

The Secretary read a report of the Agricultural Committee on the communication of Mr. J. P. McLaren as to rice cultivation stating “that as rice is already grown in the colony, the matter is beyond experiment, and that Mr. McLaren may obtain land on application to the Government.” The report was taken for notification.

Mr. Quelch stated that there was no report from the Committee of Correspondence, as there had been no meeting since his return from the interior.

Mr. Vyle brought forward his motion, of which due

notice had been given, that \$50 be granted to Mr. Rodway for further experiments in drying Bananas. Although it had appeared since the previous meeting that the idea was not confined to this colony, yet it was certain that at present there were none in the market. There was an idea that a similar article could be produced by means of American drying machines, but he (Mr. Vyle) was of opinion that the plan of drying on a layer of sand, tended more to the retention of the aroma and delicacy of flavour which had been so much appreciated the other day. That plan he thought should be followed out and further experiments encouraged.

Mr. Winter seconded the motion, which was supported by Mr. Conrad and the President, and carried unanimously.

In reply to a question from Mr. Rodway, Mr. Conrad offered to take charge of the samples when they were ready, and forward them to the most likely markets.

A letter from the Government Secretary was read, asking for information as to the probability of there being a market in this colony for potatoes grown in Grenada from English seed.

Mr. Conrad said that there would be no difficulty in disposing of a fair quantity, if the quality should be good and the price reasonable.

The meeting concurred with Mr. Conrad, and the Secretary was requested to reply accordingly.

The Secretary read a communication from the Government Secretary, covering a number of Queries sent by the Government of Barbados, as to the rates of wages paid in this colony to labourers and others. The matter was referred to the Agricultural and Colonisation Committees.

The thanks of the Society were accorded to Sir D. P. Chalmers for a copy of an engraving of the Imperial Institute, which was ordered to be framed and hung up in the Reading Room.

Mr. Quelch reported the arrival of a fine lot of additions to the Museum, which would add much to the interest of that institution.

The meeting then terminated.

Meeting held on 15th May.—R. P. Drysdale, President, in the chair.

There were 13 members present.

Elections.—*Members:* W. H. Hinds and Howell Rickford.

Associates: E. F. Bourne, H. D. Jones and J. D. Smith.

The Treasurer laid over the list of Members and Associates in arrear, whose names had been struck off the roll in conformity with Bye-Law 1, Chapter 7. This list, Mr. Conyers said, would be posted in the Reading Room, and each defaulter informed of the fact that his name had been expunged, and that he would be readmitted on payment of the arrears.

The Secretary read a communication from the Colonisation Committee, covering copy of a resolution of that Committee, and also a draft of a Leaflet which was recommended to be printed and circulated in such places as may be considered desirable. The resolution was as follows:—

“This Committee recommends to the Society, that, in order to facilitate the introduction into this colony of suitable persons prepared to make it their permanent home, the Government be approached with

a view to the making of free grants of Crown land, on suitable conditions, to such intending immigrants on their arrival in the Colony."

TO THE WORKING CLASSES OF THE WEST INDIES.

The finest field at the present time, for men with health and strength who want work and *will* work, is the Colony of British Guiana.

Estates' labourers are in demand, and will find ready employment, immediately on landing, and throughout the year at fair wages (say per day) lodgings being provided on the estates.

Able bodied men who are prepared to rough it, will find remunerative employment at the Gold Diggings which are now being worked in the Colony with an ever increasing output, as many as 14,815 ozs. valued at \$265,500 having been exported as the gatherings of the past four months. The rate of wages paid for this kind of labour varies from to per day.

Labourers are also wanted for the Woodcutting and Ballata bleeding industries who can earn from to per day.

In addition to the above, colonists are wanted, with or without families, who will settle down in the colony, making it their home, and who may obtain holdings of land on the following advantageous terms:

(a.) Free grants of Crown Land subject to certain conditions, approved of by the Governor and Legislature may be obtained on application to the Governor who is empowered under the Crown Lands Ordinance, 1887, to grant the same in the name, and on behalf, of Her Majesty.

(b.) Crown Lands under the new Crown Land Regulations 1890, after being selected, applied for, and sur-

veyed, may be purchased at public auction (upset price one dollar per acre). Should the party who has selected, applied for, and had surveyed such land, be outbidden by another party he, (this first party) will be recouped the money expended, fees, survey, &c., attending his application.

(c.) Crown lands may also be rented in tracts of not less than 25 acres for the period of 21 years, at the rate of three stivers per acre (that is five acres for one shilling) per annum, on the condition that the party renting shall cultivate or otherwise beneficially occupy within a period of two years from possession being given, one-fourth of the tract of land rented to him and shall maintain the same in good order to the satisfaction of the Government.

On the proposition of Mr. Jones, seconded by Mr. Davis, it was resolved that the resolution and draft of Leaflet, be laid over for consideration at the next meeting.

The Secretary read a letter from the Committee of Correspondence in regard to the proposed Local Exhibition, stating that though repeated attempts had been made to ascertain the chances of success of such an Exhibition in Berbice, it had been impossible, up to the present, to get any definite idea on that point.

The Secretary read a communication from the Government in answer to his letter covering the resolution of the Society in regard to experiments in growing cane seedlings, which stated that the subject would receive the Governor's attention.

The Assistant Secretary laid over further samples of two varieties of dried bananas, as well as a specimen

prepared with sugar. He had received an account of the first lot sent to England, which was very much liked and arrived in first-rate condition. The specimens then on the table were moister and retained more of the flavour of the fresh fruit than the first samples. He hoped to be able to prepare them in such a way that they would keep long enough for shipment and still be moist and full-flavoured. A number of sample boxes had been sent to England by the previous Mail, and other samples had been distributed to several persons in the colony, who had all expressed satisfaction with their flavour and appearance.

The thanks of the Society were presented for the following donations :—

For the Library—

From Mr. J. B. Harrison...“Three Cruises of the
Blake.”

„ EditorsBritish Guiana Medical
Annual

For the Museum—

From Mr. G. Garnett ...\$40 00 for a wall case.

„ GovernmentA collection of Postage
Stamps.

„ Mr. im Thurn ...A number of Zoological
Specimens.

The Meeting then terminated.

Meeting held on 12th June.—R. P. Drysdale, President, in the chair.

There were 14 members present.

Elections.—*Member* : Dr. Fredk. Neal.

Associates : P. L. Fough, J. W. Davis,
Wm. Speed, A. Field, and Wm. Bucklay.

The Secretary read a letter from the Agricultural Committee, forwarding answers to the questions on Emigration which had been referred to that Committee by the General Meeting in April.

Mr. G. Garnett, the Secretary of the Agricultural Committee, stated that the answers had been compiled from seven or eight different sources, and the rates of wages were average rather than extreme.

On the motion of Mr. Daly, seconded by Mr. Davis, a vote of thanks was accorded to the Agricultural Committee for their trouble in drawing up the answers.

Mr. Duncan spoke in favour of the accuracy of the rates of wages as given by the Agricultural Committee, which he thought very moderate. He was glad that the question of immigration had been opened up, as he thought the time had now come when great progress might be made. The Gold Industry was yet in its infancy, and he believed it would yet rival King Sugar. Then there was the Banana Industry, for which we had plenty of land, and only wanted labour, without which he was very much afraid it would come to nothing. It would be wise policy on the part of the Government to introduce more immigrants. There was a gentleman here, Mr. Rodriguez, who had been concerned in sending 12,000 emigrants from the Azores to the Sandwich Islands. The planters there did not want any more, and there were now 5,000 or 6,000 persons ready to emigrate, who might be induced to come here. Another gentleman had said that a thousand immigrants could be obtained from St. Vincent, who had been put out of employ by the abandonment of several sugar estates. These would no doubt make good and useful colonists.

Then there was Barbados, where he understood there were good labourers ready to come at the present rate of wages here. If the Government would take the necessary steps to carry out this immigration, it would be no burden to the colony, but, on the contrary, contribute to the welfare of the community. When the labourers arrived, preparations would have to be made for receiving them, and he believed that many of the estates' proprietors would be willing to take them under engagements for a year. By that time they would have become acclimatised, know the country, and be in a fair way to become useful colonists. He considered that the Society should take up the matter and urge on the Government the necessity of carrying it out, because if ever there was a time in the history of the colony when immigrants were wanted that time was now.

Mr. Garnett endorsed what had been said by Mr. Duncan and stated that the Chamber of Commerce would hold a meeting to consider the same question, on Monday, and he thought the Society might also have a Special Meeting on the same day to urge on the Government, the necessity of introducing more labour.

Mr. Jacob Conrad mentioned having seen Mr. Rodriguez, who had told him that plenty of immigrants could be obtained if they were guaranteed wages of 50 cents a day and houses apart from blacks and coolies. Mr. Rodriguez was quite willing, if invited, to come before the Society and give any further information.

On the motion of Mr. Hawtayne, seconded by Mr. Garnett, it was resolved that an Extraordinary General Meeting be held on Monday the 23rd instant, at noon, to

consider the question of Immigration, and that Mr. Rodriguez be invited to attend.

The matter of the proposed leaflet, laid over from the previous meeting, was then brought forward, and on the motion of Mr. Davis, seconded by Mr. Hawtayne it was decided, that the blanks be filled up from the answers to the Emigration questions, that the gold export returns be given to the end of June, and that a thousand copies be then struck off for circulation in the Islands.

The Secretary read a letter from Mr. D. E. Headley, Secretary of the Bedford Band of Hope Industrial Show informing the Society that that Society intended to hold a Show on the 5th of August ensuing, and asking "aid in the shape of a small donation for presentation of prizes."

It was agreed that the matter be referred to the Directors, the Secretary being directed to write to Mr. Headley for further information as to the Show.

The resolution of the Colonisation Committee, as to the Society approaching the Government to procure free grants of land to intending Immigrants, was postponed to the next Meeting.

The Secretary called the attention of the meeting to a copy of Grant Allen's "This Mortal Coil," which had been disfigured by a borrower scribbling on the title page and in the body of the work. He hoped that by pointing out the matter publicly such foolish practices would be put a stop to.

Mr. Hawtayne said that a person who could deface a book in such a manner was unfit to be a member of the Society.

Mr. Rodway laid over specimens of a great improvement in dried bananas, a sample from Trinidad, and also a box from Messrs Finney and Lambert, who were preparing to carry out banana drying as a commercial speculation.

The thanks of the Society were presented to Mr. Davis for the following works :—

12 Vols. Surinam Almanacs.

1 Copy Petition from Demerary 1803—(in Dutch) for and against free trade with England.

Mr. Quelch, Curator of the Museum, intimated that he had lately received a living specimen of *Epicrates cenchris* one of the most beautiful of snakes. It was a species of boa and showed the most gorgeous prismatic colours in sunlight.

The meeting then terminated.

REPORT OF THE AGRICULTURAL COMMITTEE.

QUESTION,—What are the current rates of wages in your Colony for persons of the following classes :—

Artisans—

ANSWER

Carpenters	...	...	...	60c	to	96c	per day
Masons	...	...	...	60	to	\$1 04	do
Smiths	...	...	...	62	to	\$1 13	do
Wheelwrights	...	...	...	64	to	80	do
Shipwrights	...	...	...	64	to	80	do
Tailors	...	...	...	—		—
Shoemakers	...	...	...	—		—

Others—

Foremen

Fitters	...	...	...	12c	to	18c	43c	per hour
Iron Turners	...	...	...	13	to	26	43	do
Brass and Iron Moulders	...	...	...	12	to	21	75	do

Porters and Carters—

In country	...	...	...	32c	to	48c	per day
In town	...	...	...	36	to	64	do

Domestic Servants—

Men	...	...	...	...\$8 70	to	\$11 70	per month
Women	...	...	...	... 4 72	to	9 08	do

Ordinary Labourers—

Men	...	...	...	... 38c	to	43c	per day
Women	...	...	...	... 20	to	23	do

Agricultural Labourers—

Men :

Cutting Canes	...	...	...	44c	to	84c	per day
do do	...	...	...	...\$4 50	to	\$8 00	per acre

Planting Canes, Cane-hole

Digging	40	to	66	per day
do do do\$7 40	to	\$10 00	per acre

Trenching and Draining	32	to	52	per day
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Forking	32	to	48	do
do\$2 25	to	\$2 75	per acre

Hoe-ploughing				
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Weeding	28	to	42	per day
do\$1 50	to	\$2 75	per acre

Moulding	24	to	32	per day
do\$1 50	to	\$2 75	per acre

Road Making	28	to	48	per day
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Other Labour	24	to	48	do
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Women :

Cane Cutting, Planting, Cane-hole Digging, Trenching, Draining and Hoe-ploughing	Same task rate as men, but they seldom, if ever, do this sort of work						
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Weeding	24c	to	32c	per day
do\$1 50	to	\$2 75	per acre

Moulding	24	to	36	per day
do\$1 50	to	\$2 75	per acre

Road Making	20	to	24	per day
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Other Labour	20	to	24	do
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Children	10	to	16	do
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Q.—With reference to Agricultural Labourers, how many hours a day are they expected to work to earn the maximum rate of wages?

A.—From 8 to 9½ hours a day, but much depends on the skill of the individual.

Q.—When the work is paid by task what may be the probable earnings of able-bodied labourers, men and women working 9 hours a day?

Cane Cutting	Men	...	53c	to	88c	per day
do Planting	do	...	45	to	81	do
do Hole Digging	do	...	—		—	
Trenching & draining	do	...	46	to	78	do
Forking	do	...	46	to	71	do
Hoe Ploughing	...	...	—		—
Weeding	Men & Women	...	30	to	54	do
Moulding	do	do	31	to	54	do
Road Making	do	do	24	to	40	do
Other Labour	...	...	—		—

It will be noticed that these rates are higher than under question 1, being based on a full day of 9 hours, the other rates being for an ordinary day.

Q.—What are the statutory or usual sizes of the tasks of each kind mentioned, &c.?

A.—Varies so that this is virtually unanswerable.

Q.—Please state generally whether there is a demand in your Colony for Emigrant artisans, labourers and others of the classes described under head 1?

A.—There is no demand at present for artisans. There is plenty of work for all other classes of labourers, but especially for steady field labourers. Good domestic servants can always find employment. Demand for unskilled labour is decidedly on the increase.

Q.—Can persons of the labouring classes, with or without a little capital, acquire small holdings of arable land, cleared or uncleared, and on what terms?

A.—On nearly all Sugar Estates and elsewhere, labourers can get land on lease for terms of 2 and 3 years, the first 10 months being given free of rent. Rent as a rule is \$1 an acre per month. Land can be obtained from the Government at \$1 per acre freehold, subject to Crown Lands Regulations; this latter sort of land is of course uncleared, the former is as a rule cleared and is also, if on an estate, properly drained. Village lots can also be obtained but the taxation is somewhat heavy.

Q.—What is the probable cost of living of persons of the labouring class in your Colony per head per day, including house rent, board and clothing, the diet being pickled and salted fish, meal, rice, sweet potatoes, &c.

A.—Good labourers can generally get house rent free on estates, failing this, rental in villages costs about from 4c. to 8c. per day, food 18c. to 24c.

Clothing would depend a good deal on labourer, but say from \$1 20 to \$2 per month would be ample for ordinary wear, 4c. to 6½ per day or altogether 26c. to 38½c. would amply cover all ordinary expenses: The calculation for food in above is very ample and in case of married people, the house rent *per head* would be much less. Besides this good labourers living on estate get the benefit of estate's hospital, free.

Q.—Please give any further information at your disposal on the subject of Creole Emigration, generally, to your Colony, and the chances of success that probably await industrious labourers there?

A.—There is a very large field for the industrious labourer and he can invariably find work to do of some class or other; the chief fault with all black labourers is that they are apt to make a speciality of work, for instance a man who is a cane cutter will do nothing else and consequently when there are no canes to be cut, he remains idle. A man who will turn his hand to any work can almost invariably find plenty of work to do, the only exception being when there is very dry weather. This demand for labour is likely to increase, as the growth in the Timber and Gold Industries is attracting a large number of creoles, the wages being very high, on an average 64c. a day and all provisions found, with the chance of earning more by extra task work. Apart from actual wages, a steady labourer can easily obtain land for growing provisions, and as the land gives very good returns living is made very cheap to those who are moderately industrious. Fish is to be had for the catching either in the fresh water canals or in the sea, and food being so easily obtainable there is a tendency amongst the black labourers generally, to get into idle habits unless their ambition is roused for some special purpose. For a hard-working industrious man accustomed to a tropical climate, this colony is equal to any in the world.

Extraordinary Meeting held on 23rd June.—R. P. Drysdale, President, in the chair.

There were 25 members present, and Mr. Rodriguez by invitation.

The Secretary read the advertisement calling the present meeting.

The chairman stated that it was unfortunate that the meeting was not a larger one, as the matter was very important. Up till lately there had been no scarcity of labour in the colony, but during the last twelve months, what with the wet weather and the gold fields, there seemed to be a great necessity for additional labourers. Everybody was grateful for the prosperity of the gold industry, but it would never do for the sugar estates to suffer on that account, and therefore some steps must be taken to get a supply of labourers from outside. There were also other industries to be supported, such as the banana and fruit cultivation, which would be a great benefit to the colony if properly carried out. They had met to consider what steps should be taken, and he would call on Mr. Rodriguez to give his views on the prospect of obtaining labour from Madeira and the Azores.

Mr. Rodriguez said that good labourers could be procured easily if they were guaranteed reasonable wages, under engagements for one or two years. Under such arrangements a great number had already gone to Brazil, and other emigrants were now going to Africa. The conditions under which he believed they could be procured were as follows:—

Wages	Single Men	...	\$18 00	per month
do	Married Men, without children	...	19 00	do
do	do do with do	...	20 00	do
do	Women above 15 years	...	15 00	do
do	Boys from 12 to 14	do	12 00	do

Dwelling houses, well ventilated, rent free. Medical attendance and hospital, free. Free education for the children. A piece of land to grow vegetables, free.

The day's labour to last eight hours, and the contract to be for one or two years with the right of renewal if the parties agree.

Under these conditions Mr. Rodriguez thought that immigrants could be procured, but he was not quite certain, on account of the present African dispute.

The chairman said that the terms appeared to him rather high, and he did not think they were in a position to contract for many people at those rates.

Mr. Bellairs said that such engagements would be simply impossible on sugar estates on account of the system of task work. He then brought forward the following resolution :—

“That in view of the prospective scarcity of Agricultural labour in the near future, consequent on the great development of the Gold and other Industries, this Meeting respectfully urges upon His Excellency the Governor, the necessity of steps being taken to introduce labourers who are willing to come under contract from the West Indian Islands, Madeira, the Azores, Cape de Verdes, &c.”

Mr. Geo. Garnett, in seconding the resolution, said he thought the best scheme that had been brought forward was that of the Planters' Association, who had sent round circulars asking the planters whether they were prepared to take Barbadian or Portuguese labourers. He thought that better than simply saying, “we want labourers and you can arrange the matter for us.”

Mr. Julius Conrad said that Mr. Bellairs' motion apparently contemplated only estates labour, his idea was that the Government should borrow three or four millions sterling, and get a sufficient supply of labour once for all, at the expense of the colony. This would be no burden on the community, as every new arrival would increase the revenue.

Mr. Weber and Mr. Gibson spoke in favour of the resolution and of the difficulty in procuring labour.

The chairman having put the resolution to the vote, it was carried unanimously.

On the motion of the President, seconded by Mr. Sherlock, it was resolved that a Committee composed of Messrs. Culpeper, Bellairs, Garnett and Gibson, be empowered to draw up a petition to His Excellency the Governor, embodying the resolution of the present meeting.

In reply to a question of Mr. Weber, Mr. Rodriguez stated that the cost of introducing immigrants from Madeira would be from \$25 to \$30 per head.

Votes of thanks were accorded to the chairman and Mr. Rodriguez, and the meeting then terminated.

List of the Lecture Series.

19.—“THE MICROSCOPE, ITS OPTICAL PRINCIPLES, CONSTRUCTION AND APPLICATION.”

*Delivered on Tuesday, February 25th, by H. T. Gladwin,
Sub-Immigration Agent.*



HE lecturer began by explaining the optical principles of the microscope, tracing the effect on the rays of light, of the various simple lenses and the combination of these to produce the compound microscope; the various applications which have been made of the microscope were then referred to, and an exhibition given of a number of slides illustrating various parts and specimens of Insects, by means of a magic lantern with the oxy-hydrogen light.

20.—“LONDON.”

*Delivered on Tuesday, March 25th, by E. C. Luard, Manager,
Plantation Peter's Hall.*

The lecturer began by giving statistics relative chiefly to the size and importance of London; and of the 49 photographic views, which were shown by means of the oxy-hydrogen light, information was given as to the history of each, with the prominent features associated therewith.

ERRATUM.

On page 89, line 22, for *Røse*, read *Röse*.

The Post Office in British Guiana before 1860.

By James Rodway, F.L.S.



UP to the time of the English conquest of the three Colonies which now form British Guiana, there was no Post Office. Of course people wrote letters, and sent them in the best way they could, but there was nothing like certainty or regularity either in the departure or arrival of the mails.

When the head-quarters of the colony of Essequibo were at Kyk-over-al, the West India Company sent out one or two vessels annually, to carry supplies and bring back the produce of the colony. By each vessel a package of letters was sent to the Commandeur. From the "Articled Letter" of the Company we are able to glean the regulations for this correspondence. The Company was very jealous that its affairs should be kept secret, and to this end provided by Articles 54 to 56 against information being given to those not concerned. No servant of the Company was allowed to write anything relating to the trade, commerce, war, or conduct of any other servant, to any but the Directors or the Chambers, on pain of losing three months wages. To the end that this should not be infringed it was forbidden to carry private letters, but they were to be delivered to the highest authority in the place, and enclosed with the correspondence of the Company. These letters were all opened, and read and certified before delivery, or might be detained if the Directors found anything which they thought should not be known. Under these cir-

cumstances there could be no *private* letters, and the servants of the Company as well as the few planters in Essequibo had to be very careful in writing to their friends.

This primitive system lasted from the earliest times, up to the latter part of the last century. A package of letters was sent to the Commandeur, who opened it himself, took out his own correspondence, and handed the remainder to the Secretary, who delivered the letters to their owners when they were called for. It does not appear that any postage was charged at first, but the Secretary exacted a fee of one guilder each when the correspondence became of importance. This amount did not err on the side of being too little, as the Secretary had such a small salary that he could only manage to live by means of the heavy fees he exacted.

There was no regular communication with Berbice or Surinam, but it was often necessary to send letters to the latter colony to be forwarded to the Netherlands, on account of the long intervals between the regular vessels. Even Essequibo and Demerara were quite isolated from each other, the planters having to send to Fort Island for their letters when a vessel arrived. The Government proclamations were sent round in canoes under the charge of colony slaves, the managers or proprietors signing their names to show that the publication had been exhibited. In Berbice, proclamations were read at certain places, the inhabitants being called together by beat of drum.

After the arrival of so many English settlers from Barbados and other islands, about 1740, communication with the West Indies became frequent, and letters were sent by private vessels. These did not go to the Secre-

tary's office, but were delivered by the ship-captains or their consignees. No interference took place in this matter, and for a long time the Government mail from the Netherlands was quite distinct from the ship letters. Letters for Demerara were often sent from England to Barbados, and called for there by petty traders from this colony.

The British would probably have established a Post Office in 1782, if the French had not captured the colony before things became settled. The only item referring to letters during the British occupation, is a publication, that it was forbidden to send letters to Berbice, unless they had been first read by Captain DAY, who then represented the supreme authority, the Governor and Court of Policy being however still retained. Immediately after the French conquest, on the 10th of February, 1782, it was published that "a ship will sail for France in 8 or 10 days, by which anyone can send letters to Holland or other countries," and that a letter-bag would be provided at Mr. SCHUYLENBURGH'S house. In January following, ADRIAN LONCO was appointed the first Postmaster of Demerara. He was bound to deliver the letters by four *white* servants, within four days after their arrival. The first messenger went along the West Coast, the second to the East Coast and Courabana, the third up the West Bank as far as *Harmensteyn*, and the last up the East Bank to *Land of Canaan*. They were to get receipts for each letter, and the Postmaster was entitled to charge a fee of five stivers. Persons who lived in Mahaica Creek and beyond, as well as those in the Upper Demerara, got their letters in the best way they could. A trusty person was sent by the Postmaster

to Essequibo, who delivered the letters for a fee of two schellings (26 cents). Correspondence for Europe was to be delivered to the Postmaster, who charged half a schelling for each letter, and the sender might demand a receipt. It was also agreed by the Court at the same time, that a mail should be despatched to Berbice every two months.

After the restoration of the Colonies to the Dutch in 1784, the Post Office was abolished, and the old system of receiving letters at the Secretary's Office restored. During the following years, up to 1796, the inhabitants suffered greatly from the want of regular communication with the mother country. In 1791 it was resolved by the Court of Policy that a subsidy be paid to provide a Mail Service to Berbice and Surinam. During the war with France between 1793-5, the mails were received and sent by way of Barbados, and a vessel was chartered by the colony as a Packet boat, but when the Batavian Republic was established, all communication with the British Colonies was cut off. On one occasion an American vessel was engaged to carry the Mails to and from St. Eustatius, as it was unsafe to send them under other than neutral flags.

In 1793 the first attempt was made to establish a local postal delivery by an Attorney-at-Law named J. C. DE LA COSTE. This gentleman established the first Printing Office, and published the pioneer newspaper of Demerara on the 1st of November 1793: Every subscriber to this paper was entitled to the privilege of having his letters carried free of charge, while other persons had to pay ten stivers for each letter. The messengers left Stabroek every Sunday morning and Wednesday afternoon, returning two days after-

wards. This arrangement lasted for two years, but does not appear to have given any profit to Mr. DE LA COSTE, in fact, a purely local Post Office in private hands could hardly be expected to pay in such a small colony.

With the British conquest of 1796, the want of proper postal communication was at once felt by the new possessors. On the 11th of June of that year, Lieutenant-Colonel HISLOP called the attention of the Court of Policy to the absolute necessity of establishing regular conveyance of letters to the army, for which he wanted Packet boats to ply weekly between Demerara and Barbados.

The Governor said that the establishment of a Packet Boat and a Post Office would be a general benefit to the inhabitants. He would therefore like to hear the opinions of the different members as to such an establishment.

After deliberation it was resolved :—

“ In consideration of the extensive use and benefit to be derived from such an establishment, for the community at large, that a Post Office shall be established in Stabroek, at the expense of the Colony, and under the management of a proper person, who shall receive an annual salary of 1200 guilders.”

To raise this sum each letter was to be charged five stivers on delivery, but no charge was to be made for those to be forwarded abroad. The Postmaster was to render an account every six months, and if the postage should not have amounted to the salary, any deficiency would be supplied from the colony chest.

It was further agreed that a Packet boat should be hired, as it would be too expensive to buy such a vessel. Until the Postmaster should be appointed, the arrangement with the Secretary's Office was to be continued, but instead of his charging a guilder per letter as before, he must only exact five stivers. All masters of British vessels

were ordered, immediately on their arrival, to hang up their Letter Bags at the Secretary's office, and, after it was established, at the Post Office; also to call for them before going away; no vessel being allowed to clear or enter without a certificate that this had been done.

The Post Office was thus fairly started as a Government institution, but the first Postmaster was a failure. On the 26th of May, 1797, the Governor reported to the Court, that Mr. THOMSON had absented himself without leave, and his whereabouts was unknown. He (the Governor) had found the Post Office in confusion and disorder, and put it under the control of the Secretary's office for the present. It was resolved to dismiss the delinquent postmaster and appoint another, Mr. JAMES MURRAY being chosen.

This gentleman did not hold the office long, being superseded by a nominee of the Postmaster-General, Mr. JAS. OGLE, who exhibited the following letter to the Governor in July, 1798:—

General Post Office, London,

April 4th, 1798.

Sir,—In the Mail for Barbados, that is now making up in this Office there will be a bag included, containing the letters for the Colonies of Demerary, Berbice and Essequibo, which the Postmaster of Barbados will deliver to you. My Lords the Postmasters General, at the instance of the merchants here, trading to the Colonies in question, have consented to give you a nominal appointment of Postmaster, you will of course dispose properly of the letters, and I beg to add that the Postmaster of Barbados is authorised to demand from you the payment of the postage as often as he shall find it convenient.

S. FREELING,

Secretary.

P.S.—Any such letters as you may not be able to deliver, from not finding the persons to whom they may be directed, or who may have

left the place, &c., the Postmaster of Barbados will return you the postage for, as dead letters.

To JAMES OGLE Esq., of Demerary,

or the person appointed by him to receive the

Demerary Bag, Barbados.

As a natural result of this communication, the Colonial Postmaster was discharged from his duties, and the Post Office was carried on under the immediate control of the London authorities. The letter from the Governor to Mr. MURRAY, was as follows:—

Government House, Stabroek,

July 3rd, 1798.

Sir,—Mr. Ogle, who has arrived in the colony, has shown me a letter signed by the Secretary of the General Post Office in London, comprehending a nominal appointment conferred on him as Postmaster in Demerary, Berbice and Essequibo. In consequence, by his acting in that capacity within this Government, your function of a Postmaster under the Colonial appointment here will cease. At the first meeting of the Court of Policy, I shall make to them the communications necessary by the above circumstance, and lay before the said Court the amount you have delivered me of postages received during the time of your acting. In the meanwhile, with respect to such letters as have not yet been taken up, and are still in your possession, I request you will cause a list of them to be inserted in the Essequibo and Demerary Gazette, noticing the persons to whom they are addressed, to send for them within a month after the date of the advertisement, as at the expiration of that time they will no longer be held by you, but submitted to the Government of the Colony to take such measures respecting them as may be deemed proper.

I return you thanks for the trouble you have taken, on my proposal, in discharging hitherto the foregoing function, and am, with great regard,

Yours, &c.

ANTONY BEAUJON.

When the colony was restored to the Batavian Republic in 1802, Mr. C. T. RAPIN was appointed Postmaster, and in January 1803, arrangements were made

for regular and quick Mail Packets to and from Barbados. However, these arrangements were almost immediately frustrated by the war again breaking out, the Mail boat being detained, and the colonists put to great inconvenience from want of regular communication until October following, when the colony was again captured by the British.

On the 17th of October 1803, the Court of Policy considered the necessity for making new arrangements with Barbados. The existing state of things was unbearable. The mails had come sometimes when opportunity occurred, but there had been no certainty of their coming at all, while, when they did arrive, it was only after long delays. Mr. RAPIN proposed that the schooner *Fanny*, belonging to Mr. BYNOE be engaged, she being known as a fast sailer and well suited for the purpose. Her owner was willing to depart from Demerary on or before the 20th, and in three days after his arrival in Barbados, be ready to return with the mails. BYNOE would take the risk of the sea, provided the Government took that of capture by the enemy, and the cost would be three joes or 66 guilders per day.

On deliberation, the Court came to the conclusion that it was not desirable to settle the matter until they heard from England, as probably something might be done by the Postmaster General. Meanwhile the Colonial Postmaster was ordered to make arrangements with Barbados, so that by the first opportunity after the arrival of the Mails there, they might be forwarded by British vessels. It was agreed that a premium of five joes should be paid to the vessel bringing the Mails, to raise which, the Postmaster was empowered to charge

ten stivers for each letter ; if this should not be sufficient the Court would make other arrangements.

On the 31st of January, 1804, Mr. RAPIN represented to the Court the material loss sustained by the Post Office, from the practice of letters being distributed by captains of vessels, and also the serious risks of the Mails being captured by the enemy. A Publication was therefore issued, ordering all persons coming from abroad to deliver their letters to the Post Office, on pain of a fine of 25 guilders for each letter otherwise delivered. Nothing could be done, however, to protect the Mail boats, so they were obliged to trust to their fast sailing in escaping the enemy.

On the 29th of May following, the Governor informed the court that His Majesty had appointed Mr. THEOPHILUS WILLIAMS Receiver of Essequibo, and Postmaster of Essequibo, Demerary and Berbice, and that Mr. WILLIAMS had arrived some days ago. Mr. RAPIN was thus superseded, and the Colonial Post Office again gave way to the Deputy Postmaster General.

Mr. THEOPHILUS WILLIAMS having several other offices, appointed his brother as his deputy, a sort of thing not uncommon at that time, when a patentee of an office had in many cases never even visited the colony. The following account of an outrage on this Deputy Postmaster's Deputy will be interesting : the Gazette of November 22nd, 1806, says :—

“ Between one and two o'clock on Tuesday last, a young man alighted from his horse at the Post Office, and went in and enquired if there were any letters for him. On being answered in the negative he used much abusive language, which occasioned Mr. WILLIAMS to desire him to depart, and to enforce his desire by pushing him on the shoulder, when the young man drew a pistol from his pocket and shot

Mr. WILLIAMS a little above the hip. He then deliberately mounted his horse and rode off. Mr. WILLIAMS did not fall immediately, but ordered his boy to endeavour to seize the assassin, which was attempted, but without effect. The best surgical assistance was immediately procured. Drs. LLOYD, DUNCAN and WADDLE attended, but all attempts to extract the ball proved fruitless. He bled profusely, did not appear to suffer much pain, was perfectly calm and collected, and made his will."

From the meagre report it does not appear what was done to the would-be assassin. He was captured by Dr. ROBINSON while trying to escape up the East Coast. A week afterwards Mr. WILLIAMS was out of danger and ultimately recovered.

There were other complaints of detention of letters, from which it appears that some persons thought the Postmaster either very careless, or else that he wilfully withheld them from the addressees. In the Gazette of March 2nd, 1813, Mr. WILLIAMS published the following peremptory demand from Mr. J. C. SCHULTZ :—

Sir,—As I am positively assured that Captain WILTON brought a letter from London to my adress, and which he accordingly deposited in the Post Office, I have therefore to request you will deliver it to the bearer ; otherwise I shall be under the necessity of addressing myself to His Excellency for the recovery of the same,—having repeatedly requested that my letters should not be delivered to any person without a written order from me."

To this charge and others the Postmaster publicly stated, that he had reason to believe that letters had been brought by passengers or retained by captains, contrary to law, and in this way never reached their owners.

In 1810, a special Mail Packet Service was established to sail monthly from Falmouth, direct to Surinam, where the vessel lay for four days, thence to Berbice, remaining three days, and finally coming to Demerara, where, after a stay of three days, she proceeded home by way

Barbados and Martinique. This arrangement remained in force until the latter part of 1813, when the Mails were again despatched twice a month by way of Barbados. The regular West Indian Mails were then made up in London on the first and third Wednesday in every month. The colony paid the expense of the "Demerary Packet" from Barbados, which cost in 1815, £20,098.10 (£1,675).

For the first fifteen years of this century the Mails were very irregular. The risks and dangers from the enemy were supplemented by delays caused by the convoy system, while it sometimes happened that the Mail Packet was captured. The American war was very disastrous; in August, 1813, the Berbice Mail, in October the *Morgiana* Packet and three other vessels, and the English October Mail to Barbados, were all captured by American privateers. On the 11th of February, 1815, the *Chesterfield* Packet arrived, and reported having had a fight with an American privateer off Madeira which lasted three hours and a half. "The enemy was superior in weight of metal, but not in bravery and skill." After both vessels were much cut up and damaged, the American made off, to the great satisfaction of the plucky little Mail Packet. In July, 1806, H.M. Ship *Nimrod* fell in with the *William* bound for Berbice, and chased her for five hours without knowing what she was. The *William* threw her letters overboard, and both vessels got aground before they found out their mistake.

Under such circumstances the Post Office in these Colonies was of very little importance. The regular Packet was often behind time, so that it was a common complaint that the news brought by the Mail

had been anticipated by other vessels. The desire for European and American news was well met by the "Royal Gazette" and "Guiana Chronicle", which almost ignored local items, while their selections were very good. The rivalry of the two local newspapers kept them on the look-out for vessels, and every now and again a complaint comes up, that the "Chronicle" had succeeded in getting hold of a newspaper that should have gone to the "Gazette."

On the 8th of March 1822, the editor of the *Royal Gazette* wrote :—

"Confound the regulators of the Post Office, say we, who do not make our packets come by steam; then we should go on at a nice jog-trot, from fortnight to fortnight, knowing exactly what quantity of pap we could afford to give our nursling at a time, being well assured of a fresh supply at the moment required; but now in this lubberly way of one packet staying a week beyond, and another coming two weeks before its time, we are bothered for three weeks together to find wherewithal to make a respectable appearance. And what kind of appearance do we make? One talks nonsense of scarlet fever and small pox and t'other responds about doctors and hempen cures. Alas ! alas ! for the poor folks who belong not to any book club ; for if they depend for intellectual food upon the newspapers, thay must starve."

The anxiety for news is well portrayed in some verses by "JERRY SNEAK," "scribbled in consequence of the hubbub the signal for a ship made this morning," July 11th 1838, of which the following extracts will show the style :—

"A sail—a sail—a promised prize to hope—
Her nation—flag—what says the telescope?
Is it the "Underwood" from London, fraught
With doleful tidings, that too soon are brought?
Or shall the "Hopkinson" the bearer be
Of what we're anxious for, yet dread to see?

*

*

*

But all agree a ship is coming in
And two hours more will silence all the din
Then we shall see (as showmen say at fairs),
"What we shall see." So useless all the airs
Of quidnunc prophecy—"Who's out," "Who's in;"
Whether they're finished, or yet to begin."

Except by the regular Packet, there was no communication with Berbice. A correspondent in the "Royal Gazette" of February 24th, 1818, suggested that some of the Colony negroes should be employed as messengers, to carry Mail bags to Mahaica, and (by arrangement) exchange with other messengers from Berbice. Nothing, however, came of this recommendation.

The enormous fees of the British Post Office was a crying evil in the early part of this century, but the charges here were entirely unreasonable. A single letter, i.e., one sheet, cost a shilling for ocean postage, while the Deputy Postmaster charged a guilder (1/8) for receiving and delivering it when called for. The smallest enclosure made a double letter, and in doubtful cases the Postmaster held the letter up in a strong light to see if it contained any tiny bit of paper.

The excessive charges were represented in the Court of Policy in 1810, but nothing could be done, as the Post Office was beyond the control of the Government. On November 2nd, 1815, the inhabitants of Demerary petitioned the Court of Policy against the exorbitant charges of the Post Office. They had to pay 66 per cent on the English postage and a guilder for ship letters. A meeting of Planters had been held at the Union Coffee House on the 26th October previous, and a tariff proposed on the basis of 10 stivers to the office for each letter. This had been submitted to the Post-

master, but without result. It was decided that the Court could not interfere, as the rates of postage were settled by Act of Parliament.

In 1818 a complaint was sent to the Postmaster General by Mr. J. H. H. HOLMES of Demerara, from which it appears that franked letters had been charged the full postage, and also that the then Deputy forced the inhabitants of Georgetown to pay extra for quick delivery, those who did not pay being subject to great delay and vexation.

Deputy Postmaster B. HARPER, in October 1824, had a little difficulty with Governor D'URBAN, which ended in his resignation. It appears that the Mail arrived a little after sunset, when the Postmaster despatched the Governor's private bag, leaving the others until morning. As the Governor expected other letters, he wrote to the Post Master for an explanation, who referred to the rules that if the Mail arrived after sunset the letters were to be delivered the following morning. He said, in his letter to the Government Secretary, "it would have taken me at least two hours by candle light, before I could have assorted the letters in the different bags, to have enabled me to ascertain if there were any for His Excellency, either private or public—not being very well I retired to bed about my usual hour, 8 o'clock. I take this opportunity of requesting you will do me the favour to state to His Excellency, my wish to be relieved from this unpleasant and unprofitable office, by appointing some person to take it over, until the pleasure of His Lordship the Postmaster-General may be pleased to appoint my successor."

Mr. WM. FRASER, who was then appointed, did not

get on very well, on account of his charging ship letters as double or triple, when, according to the opinions of the inhabitants and the custom of former Postmasters, there should have been one uniform rate of a bitt for each. The following complaint was sent by him to Governor D'URBAN on the 8th of February 1825 :—

May it please your Excellency.—I feel at all times the greatest possible reluctance in intruding myself on your Excellency's time, or being in any respect troublesome in laying before Your Excellency a complaint or grievance under which I may labour, so be it that such grievance could be endured with any degree of toleration—but when as in the present instance the cause and rise of my complaint is grounded on wanton and seemingly premeditated aggression, urgent and present necessity must plead my excuse, and procure for me Your Excellency's forgiveness.

The Mail Boat, the *Anne and Elisa*, Captain BENNETT, from Barbados, bringing the 2nd December Mails, arrived yesterday afternoon in the harbour, and duly delivered at this office, a little before the hour of 4 o'clock p.m., the mail bags. The letters and papers were assorted and ready for delivery at about fifteen minutes before the ensuing hour of five o'clock ;—from this period till about the hour of seven, or until it became dark, my assistant and myself continued to deliver letters and papers—in the course of which time we distributed and sold more than one half of the quantity received. The glut of people having by that period completely and wholly subsided and, as I supposed entirely ceased, my assistant departed and I closed the Office for the night. I had no sooner retired to my apartment to prepare myself for refreshing the wants of nature, and prepare the Berbice Mail for Captain BENNETT's return, than my hall was completely filled with a crowd of young clerks, who in the most disorderly and contumacious manner demanded their Employers' letters. From encountering so much petulance and unmerited disrespect from young men anything but respectable, I absolutely and in the most peremptory manner refused appropriating any portion of my private time to the use of a public who so ungenerously and shamefully conducted themselves in so unhandsome a manner towards me. During this altercation Captain BENNETT returned, very fortunately for me, for the Berbice Mail Bag. He was so shocked and astonished at the insolence and abuse showered upon me that he in the

most handsome and spirited manner, *although an entire stranger to me*, condemned as "unjust and highly indecorous, their conduct—a conduct at once so unbecoming and improper, that although he had been for for the space of *fifteen years* (he said,) in the Packet employ, he had never seen nor heard anything to equal it—for sheer insolence, downright imposition, and daring infringement on the respectability which ought by right to belong to the situation of Postmaster" and "which he had always seen everywhere else excepting in Demerara, duly respected and upheld with deference and due decorum."

The whole of this disorderly proceeding appeared to me, please your Excellency, to have arisen from a premeditated plot or conspiracy set afoot among a number of young men, who seem determined to annoy me by every means and method in their power. Out of the many offenders in the present instance I have in a *more* especial and particular manner to point out to Your Excellency—a young man of the name of ANTHONY FOX, Clerk in the store of Messrs. NURSE, TROUGHTON and NURSE, and another youngster of the name of LAW, in the store of Messrs. MURRAY BROTHERS & Co.

This, then, please Your Excellency is the whole matter, And in the full hope and confidence of being shielded by Your Excellency's condescending protection, both as a private individual and as a person holding an office of great responsibility and trust—having never before been in or out of my own house, so openly and audaciously insulted, I beg in the most humble manner to leave my cause in Your Excellency's hands as the Protector and Guardian of the Public Safety, as well as of the peace and security of individuals.

I have the Honour with the highest consideration and respect, to be most faithfully and devotedly Your Excellency's very obliged servant.

WILLIAM FRASER.

The salary of the Postmaster at this time was £100 per annum, with fees amounting to about £85 extra. I have been unable to discover when E. H. DALTON became Deputy Postmaster, but it was some time before 1830, from which time he and his successor E. T. E. DALTON were connected with both Imperial and Local Post Offices up to 1875. With the organisation of the Police System in 1839 an imperfect Postal arrangement for the

country districts was initiated, and carried on for a long time. It seems to have been more for the purpose of distributing the mails from abroad than for local letters. In the report of the Inspector-General of Police to June 30th 1841, he stated that the casualties in running the Overland Mail to Berbice had been numerous. It was in contemplation to establish Mail communication with the Arabian Coast through Leguan and Wakenaam to Spring Garden, and thence to Pln. Richmond, as soon as the Leguan Steamer now daily expected, commenced to ply. On the 27th of October following, the Court of Policy sanctioned a regular Mail twice a week to Airy Hall by the Steamer *Royal Victoria*, thence to be carried by a Mail gig to the Police Station at Capoey, thence to Henrietta, and finally to Windsor Castle.

In January 1842 arrived the first Mail Steamer. This event was said by a correspondent to the *Royal Gazette* to be the opening of a new era, "the advantages of which we cannot yet form any idea." The *Clyde* was described as a beautiful specimen of naval architecture. Her engine room was enough to give some ideas of what the art of man could do. She was fitted up with great elegance and comfort and could accommodate upwards of a hundred passengers. Captain WOODRUFF entertained a large party of ladies and gentlemen, including the Governor, who were all highly delighted with the appearance of the vessel, and the attention they received. The fare (£51) was considered too high; if it had been put at a charge below that of sailing vessels, the *Gazette* thought they would have secured all the passengers, and increased the number of travellers. The postage was a shilling the half-ounce for British and

foreign letters, four pence a single letter for British Colonies, and two pence for newspapers. The Steamers were very irregular at first and it was many years before there was any certainty of the Mail arriving when due.

The want of facilities for transmission of printed matter (other than newspapers) was very much felt. When the Royal Agricultural and Commercial Society was formed in 1844 a hundred copies of the Prospectus were sent in a parcel to a correspondent in London, for the purpose of being posted there. On opening the parcel at Southampton, the Custom House authorities, finding each Prospectus wrapped and addressed, put the lot in the Post Office, with the result that each addressee had to pay two shillings postage. The Society petitioned Lord STANLEY to have the postage reduced on such packages, but nothing was done for a long time afterwards.

During the struggle between the Combined Court and the Governor in 1849, the local Mail service came to grief. The Court having stopped the supplies, the police were almost disbanded and the Mails ceased to run. In the following year however arose the nucleus of our present Post Office System, and with it the introduction of Postage Stamps. The "Notice" was dated June 15th 1850, and was published in the "Gazette" of the same day. After the first of July, Mails would be made up every afternoon (Sundays excepted) for Plaisance, Beterverwagting and Buxton, to return the following morning and be delivered at 10 a.m. in Water Street and Main Street. This delivery was apparently an innovation, and, with an exception to be presently noted, did not get beyond the two principal streets for many years. Every Tuesday and Friday, a mail

went to Berbice, and on the same days others went to Essequibo, calling at various points on the route: The postage was 4 cents for the East and West Coasts, 8 cents for Mahaicony, Leguan and Wakenaam, and 12 cents for Berbice and Essequibo; newspapers being free. Prepayment was necessary in all cases, to facilitate which *Postage Stamps of the respective values of 4, 8 and 12 cents* were being printed, and would be ready for sale on or before the 24th June at the Post Offices in Georgetown, New Amsterdam and at the different receiving offices.

It is noticeable in this connection that Stamp Collectors claim to have a two cent stamp of the same issue, which is so rare as to fetch enormous sums, whenever by chance a specimen appears. This stamp appears to have been issued in accordance with a notice dated February 22nd 1851. By order of the Governor, and upon the request of several of the merchants of Georgetown, it was proposed to establish a delivery of letters, twice daily through the principal streets of the city, as far as the Roman Catholic Chapel on the Brick Dam. To pay for this convenience an extra stamp of the value of two cents was to be used, without which the letter would not be delivered, but remain in the Post Office until called for. This delivery was to commence on the 1st of March following, but as it was discontinued soon afterwards, it is probable that the extra stamp prevented that support necessary to pay for the additional Postman.

While thanking the Governor and Mr. DALTON for establishing a regular Mail along the Coasts, the colonists were not very well pleased with the system of charging by distance. A correspondent in the "Royal

Gazette" stated this objection as the reason why the Inland Post was not more used. At first sight it appeared very fair and just, but when it was considered that anyone could send letters by boat for almost nothing, it could not be expected they would pay twelve cents ; it should be four cents throughout the colony.

The matter came up in the Combined Court on April 2nd, 1851, when the Estimate was under consideration, The cost of the Inland Mail was \$600, with \$200 for the Postmasters of Demerara and Berbice, and \$1,600 for contingent expenses. Mr. O'DONOGHUE moved a resolution, which was adopted, that the Court of Policy be requested, in any Ordinance for regulating the Inland Post to fix a single rate of four cents for letters and one cent for newspapers, throughout the colony. In accordance with this resolution a notice was published on the 25th of December following that on and after the 1st of January 1852, the postage would be reduced to 4 cents per half ounce and that a charge of 1 cent would be imposed on each newspaper.

It will be interesting to collectors to read the following account of the early issues of stamps from a letter of Mr. E. T. E. DALTON, dated December 16th 1861 :—

" Prepayment by stamps was first introduced into the colony on the re-establishment of the Inland Mail in 1850. These stamps were of the respective value of 4, 8 and 12 cents, and were printed in the colony on yellow, blue and red paper. As they could be easily imitated at any printing office, I was obliged to initial them. They were of the commonest description, and were only in use a few months, until a better sort could be got out from England. The next were of the value of 1 and 4 cents, as a postage of 1 cent had been imposed on all local newspapers, forwarded per post, and the postage on letters had been reduced to one uniform rate of 4 cents per half ounce ; 1 cent red, 4 cents blue.

I may here observe that the postage on papers was soon taken off, and not re-imposed until the local Post Office Ordinance was passed in 1860. These stamps were for local letters only; those for places beyond the limits of the colony were prepaid in money. In May 1858 the Postmaster-General conceded to all the West Indian Colonies, except Barbados and Trinidad, the privilege of pre-payment of letters by English Stamps, and sent out for that purpose four different kinds, 1d., 4d., 6d., and 1s. These continued in use until the colony took over the Post Office in May 1860, when stamps of equal value, but of different currency, were executed for the service of the Colonial Post Office. The stamps then executed are those now employed, and with the 1 cent and 4 cent previously used make six kinds. The colours are 1 cent brown, 2 cents orange, 4 cents blue, 8 cents lake, 12 cents lilac and 24 cents green. Letters for Great Britain must be prepaid, as well those for the Islands. For places beyond Great Britain, not requiring pre-payment, there is no difference in the postage, whether they are prepaid or not. On local letters however, posted unpaid, double is charged."

The Inland Mail was a very great boon to the colony, but strange to say the members of the Combined Court did not see this. The spirit of opposition to the Government was so strong that everything emanating from that source was attacked inveterately. On the 15th of May 1856, when the cost was estimated at \$8,706, Mr. PETER ROSE said that the mails should be carried on horseback, so as to save the expense of carriages and harness. Mr. SMITH had moved an amendment to the vote that the Inland Mail should be done away with altogether, except fortnightly to Berbice for the English Mails. He said that the roads were very bad, and it was not wise to incur heavy expense for them unless there was sufficient trade to require the communication. The Police Stations were placed in most inconvenient positions, to suit the Mail, but not where they were most wanted, which was in the

principal villages. The Governor said that if they merely reduced the expenses of the Police for the Overland Mail to Berbice, "they would find the saving all moonshine." The amendment was lost, and the Mail carriages continued running, although they sometimes broke down through the badness of the road. On one occasion the Berbice Mail was overturned into a trench and one of the horses drowned, while minor casualties were quite common.

The Royal Mail Company suffered many severe losses in its early years. In the latter part of 1851, the *S.S. Demerara* was wrecked on her trial trip, and then came the loss of the *Amazon*, which was such a horrible catastrophe that it sent a thrill through the civilized world. The story of this ill-fated vessel has often been told, but there are a few points which have been ignored by ordinary writers, that were particularly interesting to the friends and fellow-citizens of the lost, and which are worth relating.

On the 27th of January 1852, the usual "Review for Home Readers" was published in the "Gazette," in anticipation of the Mail, and on the 29th, the Editor called attention to the fact that the packet was overdue. He went on to say that the constant detention of the Mails was a serious annoyance, from which he hoped they would soon be exempted, as it was reported that the Mail after the one then due, would be carried to St. Thomas by one of the new, large, swift steamers, the *Amazon*, which had already proved satisfactory on her trial trip.

No great anxiety was felt as yet, because irregularities had been common, but when the *Derwent* arrived

on the 3rd of February without the English Mails, people began to wonder what had become of the missing steamer.

The "Gazette" supposed it was the *Dee*, "one of the worst boats of the Company," and hoped that if any accident had happened, neither lives nor mails had been lost, but that she had been able to put back. Papers received from the Islands told them that the missing vessel was supposed to be the *Amazon*, and showed that considerable anxiety was felt with regard to her fate. This failure of a new steamer so soon after the disaster to the *Demerara* was particularly distressing.

Meanwhile the *Amazon* had left Southampton on the 2nd of January, with a crew of 110 men, and 50 passengers among the latter being Mr. M'LENNAN, (a Stipendiary Magistrate) with his wife and infant, Mr. ROBERT NEILSON, Mr. ROBERT HICK, and Miss SMITH, all bound for Demerara.

Some little anxiety was felt by the passengers when on two or three occasions, the engines had to be stopped to prevent the bearings becoming over-heated, but no danger was anticipated. However, a little after midnight on the morning of the 4th, when steaming through the Bay of Biscay, with half a gale of wind in her teeth, the passengers were woke with a cry of "Fire! Fire!"

The scene of confusion was indescribable; the passengers ran on deck in their night-dresses to find the flames lighting up the surrounding darkness, and roaring horribly as the wind rushed to feed them like the blast of a furnace. Mrs. M'LENNAN caught up her child and ran across to her husband's berth. The door was locked, and it was not until she had knocked loudly and called out at the top of her voice that he woke up. They

rushed on deck in their night-dresses and Mr. M'LENNAN exclaimed, "Oh God, the ship is on fire!" He then urged her to go down and get some clothes for herself and the child, and went down himself, but she was too frightened to move. An officer said to her, "give me your child and I will save him." He took the boy, handed him to a seaman who was sitting in the pinnace, and lifted her up into the same boat, against her protestations that she wanted to fetch her husband. The officer then sat beside her and ordered the men to cut the lashings. The boat dropped at one end, but owing to a hitch in the block the other end held fast. As the boat was hanging almost vertical, most of the people fell into the sea, but Mrs. M'LENNAN caught hold of a fixed seat by one arm and her baby by the other, and hung there until almost exhausted, calling for help. At last some men coming to look after the boat found her, and having righted it, got in with her, and succeeded in getting clear of the burning vessel. They were tossed about for 17 hours, Mrs. M'LENNAN being drenched to her waist in water by the sea continually breaking over the boat. Without food, clothes or shelter, the poor wife (or widow) held on to her babe through that night and the next day. A shawl which she had snatched up to cover the child, was the only article they had to make a sail to keep the boat before the wind. They were at last picked up by a Dutch vessel, the *Gertruida*, and taken to Brest, Mrs. M'LENNAN being almost insensible, but still clinging to her babe. Her husband having been lost she went back to Edinburgh, and abandoned her intention of coming to Demerara.

Miss SMITH, who was coming to Demerara as a

governess, awoke at the first alarm of fire and ran on deck in her night-dress, with a blanket thrown over her shoulders. She saw the cutter floating at the side of the steamer and jumped into her, (a distance of fifteen feet) just as the boat was pushing off. The lady lay in the bottom, covered with the blanket, but gave up her covering when told that it would make a sail. The sailors however contributed what coats they could spare to cover her, and she sat in the stern-sheets translating their orders to the steersman, who happened to be a Belgian. They pulled through the night and all Sunday, until quite exhausted, when at last they were picked up by the *Gertruida*, which had just before rescued the pinnace.

Altogether, five boats were picked up, containing fifty-nine survivors; the burnt and drowned therefore numbered 102. Mr. NEILSON got off with others in the life-boat, which was picked up by the *Marsden*, but Mr. M'LENNAN and Mr. HICK were never heard of afterwards.

The news was brought to Demerara on the 12th of February, "throwing a great gloom over the community." All the shipping in the river hoisted their flags at half-mast, as did also the authorities of the Reading Room. The "Gazette" said that "the manner in which that new steamer had been lost was shocking, dreadful,—perfectly frightful. Of the hundred and fifty-six persons on board not a third were saved. Some were burnt to death, others suffocated in their berths, and others drowned. The fearful scene on board surpassed all description." Hopes were still entertained that Messrs. M'LENNAN and HICK might yet be picked up, but they were doomed to be disappointed.

In 1850, on account of new English Mail arrangements, and the difficulty in answering a letter by the same steamer, several gentlemen on the East Coast made arrangements for signalling her. A blue and red flag was carried on the Railway engines, and a similar signal hoisted at the stations, whenever the Mail arrived in the night or early morning, so as to give the people along the line notice to go for their letters. Sometimes the Mails were made up before the steamer was signalled, at other times only a very short time was allowed. The colony had to thank ANTHONY TROLLOPE for a little concession in this matter, he having recommended Mr. DALTON not to close the letter box until the Mail was signalled.

ANTHONY TROLLOPE arrived in the colony by the steamer *Derwent* on the 25th of February 1859 and left on March 11th following. This short residence of a fortnight gave him material for his amusing account of the colony in "The West Indies and Spanish Main." His visit here meant a revolution in the economy of the Post Office, he being deputed to make arrangements for the abolition of the Deputy Postmaster General. The following is a copy of his letter to the Governor :—

Georgetown, Demerara 26th February, 1859.

Sir,—Your Excellency is aware that the Postmaster-General is anxious to induce the Colony of British Guiana to undertake the control of the two Post Offices, which are now established under His Lordship at Demerara and Berbice. The matter has, I believe, been twice submitted to the local Legislature, and the proposal has, on each occasion, been rejected by a majority.

The Post Offices at, by far, the greater number of English Colonies have now been taken up by the Local Governments. This has lately been done at Barbados and Trinidad. There are many reasons why they should be better managed under the control of a resident Governor

than by surveillance exercised at so great a distance as London; and this would certainly be done with greater economy by the Local Government.

Your Excellency is aware of the terms, with reference to the division of the rates of postage, upon which it has been proposed to hand over the Post Office to the colony.

It appears that such a transfer is peculiarly desirable at Guiana, where there is a Local Post Office already under local control, together with local rates of postage, and a local system of post conveyance.

Under these circumstances, the Postmaster-General would be glad that Your Excellency should make any suggestion that may occur to you with the view of carrying out this object. It may perhaps appear to you probable that the measure might be a third time submitted to the Legislature with some chance of success, or failing that, that other steps might be taken by the home Government which would have the effect desired.

I have the honour, &c.,

ANTHONY TROLLOPE, Surveyor, General Post Office.

As a result of ANTHONY TROLLOPE'S visit "An Ordinance to establish a Colonial Post Office" was passed on the 3rd of January 1860 and came into operation on the 2nd of May following. Since that time there have been many improvements, and altogether it may be said that our Mail service, both inland and foreign, has attained to a wonderful degree of perfection as compared with what it was thirty years ago. There is, however plenty of room for improvement, especially with regard to postal deliveries in the country districts.

Fireflies.

By Lady Blake, Jamaica.



LIGHT is always in itself beautiful and attractive. It would be difficult or impossible to imagine a light that would be ugly or repulsive. Even a tallow dip flickering in the window of a hovel, sends a thrill of pleasure and comfort through the breast of the traveller toiling across some lonely bog or through a gloomy forest, and it is difficult to realize that the glow of the will-o'-the-wisp ought to be shunned and not followed. But if inanimate light is beautiful and wonderful, how surpassingly lovely and astonishing are those living creatures whose bodies are temples not alone of life, but of actual light. The glow-worm, common and lowly insect as it is, never fails to attract the attention of a passer by, though few probably, pause to reflect over the marvel of the little hedge-row *Hero* untiringly showing a light to guide the tiny winged *Leander* to her bower. The life history of the glow-worm is well-known, and from the poetical point of view, except to a gardener, it is somewhat disappointing to know that both the larva and perfect insect are predatory and feed upon snails. The male insect, though generally supposed to be non-luminous, emits a certain amount of light, though in a far less degree than the wingless female. Even the eggs of the beetle are said to be luminous. The English poets from SHAKESPEARE downwards are fond of associating glow-worms with fairies and spirits. In the "Merry Wives of Windsor" when FALSTAFF is tor-

mented by Mistress QUICKLY, ANNE PAGE, Sir HUGH EVANS and others disguised as fairies, Sir HUGH says :—

“ Pray you lock hand-in-hand :
Yourselves in order set ;
And twenty glow-worms shall our lanterns be,
To guide our measure round about the tree.”

In the “ Midsummer Night’s Dream” TITANIA when ordering the elves to wait on the Weaver desires them :—

“ The honey-bags steal from the humble bees,
And for night-tapers crop their waxen thighs
And light them at the fiery glow-worm’s eyes,
To have my love to bed and to arise.”

And in HAMLET’S interview with his father’s ghost, when the spirit is about to depart, it exclaims

“ Fare thee well at once,
The glow-worm shows the matin to be near,
And ’gins to pale his uneffectual fire :
Adieu, adieu !”

In DRAYTON’S Nymphidia, the encounter of TELAMON with a glow-worm when the Fairy King is seeking his missing Queen is thus described :

“ He next upon a glow-worm light,
(You must suppose it now was night)
Which, for her hinder part was bright
He took to be a devil :
And furiously doth her assail,
For carrying fire in her tail ;
He thrashed her rough coat with his flail ;
The mad King feared no evil,
‘ Oh !’ quoth the glow-worm, ‘ hold thy hand—
Thou puissant King of fairy-land,
Thy mighty strokes who may withstand ?
Hold, or of life despair I.’
Together then herself doth roll,
And tumbling down into a hole,
She seemed as black as any cole,
Which vexed away the fairy.”

It is unnecessary further to multiply quotations on the subject.

The glow-worm is not the only luminous creature found in the British Isles. Some species of centipedes are said to emit a phosphorescent light, and on one occasion in the West of Ireland, we observed some brilliant creatures when driving home on a dark night, lying in the middle of the road. On investigation they turned out apparently to be common earth worms, though I believe it is a moot point whether the worms are ever in themselves luminous, or if the appearance is caused by the centipede, which preys on earth worms, having crawled over and left some portion of its phosphorescence on them. If we leave England to go further south, how exquisite it is to see the myriads of winged gems flashing their minute lanterns in the meadows of the Tyrol, or the lowlands of Lombardy. No wonder the Italian peasant considers fire-flies to be spirits arisen from their graves, though it is strange that the dread with which all spiritual appearances have become invested amongst civilized people, makes the ignorant contadino shun the lonely apparition with terror. In the Tyrol, fire-flies are known amongst the country people as "Johannes Käfer," that is "John's Beetles," as after St. John's Day in Midsummer they are no more seen till the following year.

But going still further, if we are fortunate enough to find ourselves in the tropics, how unspeakably beautiful is a moonless night in the West Indies, when mountain, forest, and plain are throbbing with lights of various sizes and intensities, from the minute fire-fly of about $\frac{3}{8}$ of an inch in length, to the splendid "cucuyo" or fire-

beetle over an inch long with two large eye-like lights in the thorax and the abdomen glowing like a living emerald. It is singular that the life history of creatures so numerous and so common should be almost unknown, the theories on the subject being very conflicting. It is an interesting field for exploration that awaits some future biologist. Scientists are prone to set inordinate value on names and genera, so the fireflies have been placed amongst the *Lampyridæ*, while the fire-beetles are pronounced to belong to the *Elateridæ* family, but where the "cucuyo" as the Spaniards name him, (*Pyrophorus noctilucus*) emerges from the egg, or how he passes his larval youth and acquires the power of shining in the world, is still a matter of conjecture. Rotten wood is by some supposed to be the cradle of all this brilliancy, while others hold that the imago, anticipating the votaries of "Sweetness and Light" draws his nourishment from the sugar-cane, and roams the earth in the humble guise of a wire-worm. Every one has read how the Creole ladies sometimes put diamonds to shame by wearing fireflies in their hair and on their dresses at balls in Cuba and the other islands, but one of the most picturesque uses to which fireflies were ever put, was on the evening the band of French settlers first landed at Montreal. Their first care was to raise an altar "on a pleasant spot near at hand." Some of the high-born ladies who were with them, decorated the sylvan altar with such flowers as the place afforded, and then all the company, soldiers, artisans, sailors and labourers, devoutly knelt on the sod while the Priest celebrated Mass, and by and by when evening closed in and fireflies began to twinkle around, the pious French emigrants captured

the glittering visitors, tied them into shining festoons and hung them before the altar where the Blessed Sacrament still remained. Then tents were pitched, watch fires lighted and sentries posted, and the first French colonists lay down and slept peacefully on Canadian soil.

The Spanish discoverers on returning home did not fail to enlarge on the wonders of the fireflies in the newly found lands. PETER MARTYR'S account of what he learnt on the subject from the voyagers is so curious that I quote it at length:—"In Hispaniola and the rest of the Ocean Islands, there are plashy and marish places, very fit for the feeding of herds of cattle. Gnats of divers kinds, engendered of that moist heat, grievously afflict the colonies seated on the brink thereof, and that not only in the night, as in other countries: therefore the inhabitants build low houses, and make little doors therein, scarce able to receive the master, and without holes, that the gnats may have no entrance. And for that cause also they forbear to light torches or candles, for that the gnats by natural instinct follow the light, yet nevertheless they often find a way in. Nature hath given that pestilent mischief, and hath also given a remedy, as she hath given us cats to destroy the filthy progeny of mice, so hath she given them pretty and commodious hunters, which they call cucuy. These be harmless winged worms, somewhat less than backs (bats) or reere mice, I should rather call them a kind of beetles, because they have other wings after the same order, under their hard-winged sheath, when they leave flying. To this living creature (as we see flies shine by night and certain sluggish worms lying in thick hedges) provident nature hath given 4 very clear looking glasses; 2

lying hid in the plank under the sheath, which he then sheweth . when after the manner of the beetle, un-sheathing his thin wings, he taketh his flight into the air, whereupon every Cucurus bringeth 4 lights or candles with him. But how they are a remedy for so great a mischief, as is the stinging of these gnats, which in some places, are little less than bees, it is a pleasant thing to hear. He, who either understandeth he hath those troublesome guests (the gnats) at home, or feareth lest they may get in, diligently hunteth after the cucuy. which he deceiveth by this means and industry, which necessity (effecting wonders) hath sought out. Whoso wanteth cucuy, goeth out of the house in the first twilight of the night, carrying a burning fire-brand in his hand, and ascendeth the next hillock, that the cucuy may see it, and swingeth the fire-brand about calling the cucuius aloud, and beateth the air with often calling and crying out Cucuie, Cucuie. Many simple people suppose that the cucuy delighted with that noise, come flying and flocking together to the bellowing sound of him that calleth them, for they come with a speedy and headlong course ; but I rather think the cucuy make haste to the brightness of the fire-brand, because swarms of gnats, fly unto every light, which the cucuy eat in the very air, as the martlets and swallows do. Behold the desired number of cucuy, at what time the hunter casteth the fire-brand out of his hand. Some cucuius sometimes followeth the fire-brand, and lighteth on the ground, then is he easily taken, as travellers may take a beetle (if they have need thereof) walking with his wings shut. Others deny that the cucuy are wont to be taken after this manner, but say, that the hunters espe-

cially have boughs full of leaves ready prepared, or broad linen cloths, wherewith they smite the cucuius flying about on high, and strike him to the ground, where he lyeth as it were astonished, and suffereth himself to be taken, or as they say, followeth the fall of the fly, they take the prey, by casting the same bushy bough, or linen cloth upon him, howsoever it be, the hunter having the hunting cucuius, returneth home, and shutting the door of the house, letteth the prey go. The cucuius loosed, swiftly flyeth about the whole house seeking gnats, under their hanging beds, and about the faces of them that sleep, which the gnats use to assail, they seem to execute the office of watchmen, that such as are shut in, may quietly rest."

Unfortunately the Spaniards seem to have been mistaken in regard to the supposed voracity of the cucuy in regard to mosquitoes, but it is singular that to this day the negroes in Jamaica believe that the "peenies" as the insects are commonly called there, may be taken in a way very similar to that described by the Abbot of Sevilla Nueva. If you hold a peenie between your fingers on a dark night and stand in the open air, shaking it about and calling aloud "Peenie, peenie weary, come to be fed" the other peenies, say the negro peasants, will come hastily flying up to their fellow and can easily be taken.

To return to MARTYR: "Another pleasant and profitable commodity proceedeth from the cucuy. As many eyes as every cucuius openeth, the host enjoyeth the light of so many candles; so that the inhabitants spin, sew, weave and dance by the light of the flying cucuius. The inhabitants think that the cucuius, is delighted with

the harmony and melody of their singing, and that he also exerciseth his motion in the air according to the action of their dancing. But he, by reason of the divers circuits of the gnats, of necessity swiftly flieth about divers ways to seek his food and our men also read and write by that light, which always continueth until he have gotten enough whereby he may be well fed. The gnats being cleansed, or driven out of doors, the cucuius beginning to famish, the light beginneth to fail, therefore when they see his light to wax dim, opening the little door, they endeavour to set him at liberty, that he may seek his food. In sport and merriment, or to the intent to terrify such as are afraid of every shadow, they say that many wanton, wild fellows sometimes rubbed their faces by night with the flesh of a cucuius being killed, with purpose to meet their neighbours with a flaming countenance, knowing whither they want to go, as with us sometimes wanton young men, putting a gaping toothed vizard upon their face, endeavour to terrify children, or women who are easily frightened, for the face being anointed with the lump or fleshy part of the cucuius, shineth like a flame of fire, yet in short space that fiery virtue waxeth feebler, and is extinguished, seeing it is a certain bright humour received in a thin substance."

The insect certainly retains a small amount of light for some time after death. The luminous portion of the abdomen easily separates from the remainder, it is a tough, slightly elastic substance, the light becoming more brilliant when the separated portion is squeezed, many authorities hold that the light is phosphorescent in its nature, but the distinguished Italian Scientist, MATENNI, has demonstrated by chemical analysis, that

it does not contain phosphorus, but is apparently an elaborate nervous mechanism. MARTYR has much to tell about the beetle. He continues :—"There is also another wonderful commodity proceeding from the cucuius. The islanders appointed by our men go with two cucuy tied to the great toes of their feet (for the traveller goeth better by direction of the lights of the cucuy than if he brought so many candles with him as the cucuius open eyes) he also carrieth another cucuius in his hand to seek the Utiaë by night. Utiaë are a certain kind of cony, a little exceeding a mouse in bigness and bulk of body, which four footed beast they only knew before our coming thither, and did eat the same. To go also a fishing by the lights of the cucuy, unto which art they are chiefly addicted, and exercised therein from the cradle, that it is all one with either sex of them to swim, and to go upon the dry land. * * * * * While I was writing this discourse of the pretty cucuius, a little before noon, accompanied with CAMILLUS GILLIVUS (whom I make my continual companion, both because he is Your Excellency's servant, (MARTYR is addressing Viscount FRANCISCO SFORZIA, Duke of Milan) as also for his pleasing disposition and behaviour) JACOBUS CANIZARES the doorkeeper of CÆSAR'S chamber, came with me unexpected, who also from the first beginning of these things (together with no small number of Palatines, the familiar friends of the Catholic Princes FERDINANDO and ELIZARETH, young men desirous of novelties) went with COLONUS himself, when having obtained the second fleet of 17 ships he undertook the matter or discovery of the ocean; whereof I have sufficiently, and at large discoursed to ASCANIUS. He

declared many things in the presence of GILLIVUS while we were at dinner. Who when he saw I had made mention of the cucuius, saith, that in a certain island of the Canibals, in an exceeding dark night, when they went ashore to lay on the sands, he first saw only one cucuius, which came forth of a wood near unto them, so shined upon their heads, that the company might perfectly see, and know one another, and he affirmed with an oath, that by the light thereof, letters might easily be read. Also a citizen of Seville, a man of authority, called P. FERNANDEZ DE LAS VARAS, one of the first inhabitants of Hispaniola who first erected an house of stone from the foundation in Hispaniola, confesseth the same, that by the light of a cucuius he had read very large letters."

Any one who visits the West Indies can easily verify this statement for themselves, and it is easy to understand that the native Indians who possessed neither candles nor lamps, and who only knew of torches made either of some light wood or of the fibrous interior of the Dildo cactus, often availed themselves of the brilliant beetles when busy after night-fall in their very simple domestic avocations. Even with all the complicated comforts of the present day, it was the common practice of members of our family when entering a room at night, to catch a firefly in order by its light to find the match box.

GOSSE, who during his residence in Jamaica made valuable observations on fireflies, states that he met with about 14 species during his eighteen months stay in the island. A larva was once brought to him which he believed to be that of the fire beetle, it was luminous. He describes the whole insect as being pellucid in the

dark, the divisions of the segments showing distinctly, a pale blue light, not very vivid. When touched the creature bit fiercely but ineffectually at the disturbing hand. As it is stated that some of these insects pass no less than three years in the larval stage, it must evidently be a matter of much difficulty to keep them successfully under observation during so long a period, so as to be able to arrive at a satisfactory conclusion as to their history. As yet the glow-worm can boast a more important rôle in literature and poetry than its more brilliant West Indian relation, but the fireflies of tropical America have not altogether escaped the observation of our poets, and I will conclude this with SOUTHEY'S description in "Madoc" of a tropical night.

"Sorrowing we beheld

The night come on ; but soon did night display
More wonders than it veiled ; innumerable tribes
From the wood-cover swarmed, and darkness made
Their beauties visible ; one while they streamed
A bright blue radiance upon flowers which closed
Their gorgeous colours from the eye of day ;
Now, motionless and dark, eluded search,
Self-shrouded ; and anon, starring the sky,
Rose like a shower of fire."

Statute Law Revision.

By Dr. J. W. Carrington, C.M.G., Attorney General.

THE condition of its statute laws must always be a matter of very great interest and importance to any political community. It is clearly to the advantage of the State that its individual members should be well acquainted with the laws by which they are governed and whose operation affects to a greater or less extent their conduct and business and their relations with one another. We may go further and say that an obligation rests on the State to present to its individual members the body of public laws in a form so convenient, so well-arranged, and so accessible that they can readily make themselves acquainted with its provisions. This duty was recognized so long ago as the fifth century A.D., by the Emperor THEODOSIUS, at whose instance the Theodosian Code—which was a collection of the edicts and constitutions of the rulers of the Eastern Empire from the time of CONSTANTINE—was prepared and published. This Code was followed in the ensuing century by the more comprehensive and elaborate collections of laws made and published by the order of the Emperor JUSTINIAN. It is not necessary or desirable to enter in this place into the history of this collection of Roman Law; it is sufficient to say that it is not easy to over-estimate its influence on the jurisprudence of modern civilized nations and especially those of the Latin race. But, to quote the remarks of

Mr. EDMUND ROBERTSON, M.P., in the article 'Code' in the last edition of the *Encyclopædia Britannica*, " the same causes which made these collections necessary in the time of JUSTINIAN have led to similar undertakings among modern peoples. The actual condition of laws until the period when they are consciously remodelled is one of confusion, contradiction, repetition, and disorder ; and to these evils the progress of society adds the burden of perpetually increasing legislation. Some attempt must be made to simplify the task of learning the laws by improving their expression and arrangement." It is not proposed to do more in this article than touch very lightly on the question of the codification of the civil law of British Guiana, and it would therefore be out of place to describe here what has been done—and it is a great deal—within the present century in France and most of the other countries of Europe, in the State of New York, and in Lower Canada or Quebec in the way of codifying the civil and other branches of public law. While I by no means underrate the great and pressing importance of this question, yet it is obvious that its adequate discussion would require a separate paper, and my only object at present is to describe the existing condition of the ordinary statute law of the Colony, and to make some suggestions for its improvement. For this purpose it may be found instructive to inquire briefly what has been done in recent years in the way of preparing and publishing improved editions of their statute laws by other English-speaking countries and places, and especially, since their circumstances more closely approximate to ours, by the British West Indian Colonies.

Revision in the United Kingdom.

To turn first to the Mother Country, the burden of the *rudis indigestaque moles* of the Statute Book has been for many years felt to be very heavy, and in 1868 Lord CAIRNS, the then Lord Chancellor, determined to provide a remedy. For this purpose he appointed certain distinguished lawyers to be a Statute Law Committee. The object of the formation of this Committee was to make the necessary arrangements for, and to superintend the publication of, a Revised Edition of the Statutes. The Committee concluded their labours in 1885, with the result that the entire body of statute law in force up to that year was presented to the public in 18 well-arranged and well-printed octavo volumes. There was also prepared and published a volume containing a Chronological Table of the Statutes, as well as a digested Index of the whole of the then existing statute law. But although the publication of these works was an enormous benefit to the general community and a still greater one to all persons concerned in the administration of the law, yet there was the drawback that they were expensive, and, besides, by the time the publication of the revised edition was completed in 1885 a large number of enactments included in the earlier volumes had been repealed. Accordingly, when Mr. GEORGE HOWELL, M.P., in 1886, pressed upon the Government the expediency of providing a cheap edition of the statutes for the use of the public, and, in particular, for sale to public libraries accessible to working men, it was resolved to issue the revised edition in a cheaper form and embodying all the alterations made in the statutes up to the date of publication. Several volumes

of this new edition, well printed in a large octavo, have been already published, and it is hoped that the work will be completed in two or three years. Only those who have had occasion to refer to the old and cumbrous tomes in which Acts of Parliament were formerly embodied can appreciate the full benefit of this neat and handy edition of the collected and revised Statutes of the Realm. It should be mentioned that the enactments are arranged in chronological order.

Revision in the United States.

The Congress of the United States of America have proceeded further in the path of statute law reform than the Imperial Parliament. In 1866 an Act was passed providing for "the revision and consolidation of the Statute Laws of the United States." Three lawyers were appointed Commissioners for the purposes of the Act, their duty being declared to be "to revise, simplify, arrange, and consolidate all statutes of the United States, general and permanent in their nature, which shall be in force at the time such Commissioners may make the final report of their doings." When the Revised Statutes were settled by the Commissioners they were submitted to Congress *en bloc* and passed, no doubt with alterations and amendments, at the Session held in 1873-74. The work was published in 1874 under the authority of an Act passed in that year. In 1877 an Act was passed for the preparation by a single Commissioner of a new edition of the Revised Statutes, and this edition was completed and published in 1878. It forms a large quarto volume of 1,394 pages. The contents are arranged, according to their subject matter, in 74 Titles, or principal heads, and 5,601 Sections. The work is well and clearly

printed, but one may be permitted to say that the insertion of a "lead" or space between the several Sections would have produced a marked improvement in the appearance of its pages.

Revision in Canada.

Before the establishment of the Dominion of Canada in 1867, both Upper and Lower Canada had their "Consolidated Statutes," and so also had the Province of Canada after the two Provinces were united into one in 1840. All these works are arranged somewhat on the plan of the Revised Statutes of the United States. I have no information as to the publication or otherwise of a compilation of the statutes of the Dominion since 1867.

Revision in British West Indian Colonies.

To come nearer home, it will be found that the British West Indian Colonies have not, generally speaking, been unmindful of the importance of statute law revision. This remark is true, at any rate, of all these Islands in the neighbouring seas; with respect to Jamaica and the Leeward Islands I have no definite information on this subject. The efforts in this direction of the Colonies here referred to may be briefly mentioned. In 1884 the Legislature of Tobago made provision by a special Ordinance for the preparation and printing of a new and collected edition of the statute laws of the Colony. As these laws had not been printed in a collected form since the year 1810, and as there was consequently great confusion and uncertainty in regard to them, it was provided that there should first be an entirely new draft edition; that this edition should be printed and submitted to the Legislature for their consideration; and that, when finally settled, it

should be printed as law. The draft edition was prepared by the present writer, and advantage was taken of the favourable opportunity thus offered to arrange the proposed enactments in "Books" according to their subject matter. The draft edition was actually completed and printed in a large octavo volume, but unfortunately the labour and money expended on it were expended in vain, for the union of Tobago and Trinidad in 1889, and the enactment in the smaller of the laws of the larger Colony, took away the *raison d'être* of a separate statute book for Tobago.

In 1883-84 a collected edition of the "Laws of Trinidad" in five octavo volumes was published by authority of the Government of the Colony. It was prepared by Mr. G. L. GARCIA, the present Solicitor General, under the supervision of Mr. (now Sir HENRY) LUDLOW, the then Attorney General, of the Colony. The copy of this work in the possession of the Government Secretary's Office is without an index, but I am unable to say whether one was published separately.

The Island of Grenada is in possession of a revised and collected edition of its laws, in one octavo volume, published in 1875. It is the work of three Commissioners, one of whom was Mr. Justice W. A. M. SHERIFF, who was then Attorney General of the Colony; and it superseded an earlier edition prepared in 1852 by Mr., afterwards Sir WILLIAM, SNAGG, who was then Attorney General of Grenada.

In St. Vincent there have been, I believe, two collected editions of the laws of the Colony published during the last twenty or thirty years. The second of these was brought out some two years ago under the

editorship of Mr. J. C. CHOPPIN, the able and learned Attorney General of the Colony. It is in two octavo volumes.

In St. Lucia a compilation of the local laws, in a moderate sized octavo volume, was published in 1853. It was succeeded in 1889 by a new collected edition, prepared by the present writer under the authority of a special Ordinance passed in 1887, which conferred upon the compiler large powers of revision and consolidation. This compilation takes the form of a single large octavo volume, printed at the Clarendon Press, Oxford.

The Legislature of Barbados have from time to time shown a commendable anxiety to place the local laws in a convenient form in the hands of the people of the Colony. A collected edition, in one octavo volume, was issued in 1855. This was followed by a supplementary volume in 1864. Eleven years later a new collected edition, in two octavo volumes, was published. This will shortly be displaced in its turn by yet another edition, of an improved kind, which has for some time been in course of preparation, the Commissioners being, I believe, the two Crown Law Officers of the Colony, Mr. H. A. BOVELL and Mr. W. H. GREAVES. It thus appears that, in a period of somewhat less than forty years, there will have been published, at the instance and by the authority of the local Legislature, no less than three revised and collected editions of the statute laws of the Colony.

The Legislatures of the more distant Colonies of the Bahamas, the Bermudas, and British Honduras have also been not unmindful of their obligations in this matter of statute law revision. In each of these Colonies

there are revised collections of the laws, of recent date and competent editorship. The last collection of the Bahamas laws is made on the principle of a classification of Acts under various headings according to their subject matter, but each Act preserves its own date and its identity generally. The British Honduras collection is more nearly assimilated in its method and plan to the Revised Statutes of the United States than any other of those to which reference has been made, except perhaps that of Canada. It contains the statute laws of the Colony welded together in one whole, comprising 35 Parts and 119 Chapters, arranged according to their subject matter. The compilation forms a single large octavo volume of 972 pages. Its preparation was, I believe, begun by Mr. Justice SHERIFF, who was then Chief Justice of the Colony, and was completed by Mr. W. M. GOODMAN, who succeeded Mr. SHERIFF in the office of Chief Justice.

Condition of the local Statute Book.

Having ascertained the circumstances of this matter of statute law revision in those countries and places whose example might be of interest and value for us, let us now proceed to inquire into the condition of our own statute book, and to ask what efforts have been made by the Legislature and Government for its improvement in the way of publishing revised and collected editions. The answer on both these heads is of an unsatisfactory kind. It must be frankly admitted that our statute laws are in a chaotic condition and that we are not possessed of a single revised and collected edition of them, published by authority. It may, indeed, be affirmed that, in the strict sense of the words, the Colony has no statute book

at all. To show that this remark is not overstrained, let us take the cases of some of the principal public offices of the Colony.

In the Government Secretary's Office there is preserved a small folio volume containing, together with other documents of a miscellaneous kind, enactments of the Governor and Court of Policy of the United Colony of Demerara and Essequibo. These enactments extend over the period from 1810 to 1826. They are remarkable for variety in several respects. Some are in MS. and some in print, and among these latter there is no pretence at uniformity of type or mode of printing. Most of them are called "Acts or "Publications," while some are termed "Proclamations" and others again "Ordinances."

In 1831, with the union of the three Colonies of Demerara, Essequibo, and Berbice into one Colony under the name of British Guiana, there commenced the regular publication in print of Ordinances enacted by the Governor with the advice and consent of the Court of Police and of the enactments relating to the imposition of taxes and duties, which were then, as now, passed by the Governor with the advice and consent of the Court of Policy with the Financial Representatives of the Inhabitants of the Colony in Combined Court assembled, and which were then, as now, styled "Publications." The Government Secretary's Office possesses copies of these laws from 1831 to the present time, bound in annual volumes. But the volumes for the following years are missing,—1844, 1851-52-53, and 1859-60-61. The form employed from 1831 to 1876, inclusive, was small folio. The type and style of printing are marked by considerable diversity, a small font and blue

paper being not infrequently used. In 1877 a convenient quarto form was adopted, and has remained in use to the present time.

This, then, is the state of things with regard to the possession of authorized copies of the local laws in the principal public office of the Colony. Nor is the case any better, but rather worse, in some other important departments. The Attorney General's Chambers do not appear to have had an official copy of the laws, as published by the Government Printer, until within the present year, when the Governor considerably made arrangements for purchasing a set of them, at a very considerable cost. This set commences in 1844 and extends virtually to the present time, but with a *hiatus*, the volume for 1863 being missing. The appearance of one of the more important Ordinances in the earlier of these volumes, with all the repeals and amendments of later legislation noted on it, is as of a piece of Chinese literature.

In the Office of the Registrar there is a collection of these original laws, but with the following gaps occurring in it,—1842-43-47-48, and 1855-56-57-58. In 1865 the practice of enrolling in this Office a copy of every Ordinance as enacted, authenticated by the Governor's signature and the Public Seal of the Colony, was commenced and has been continued until the present day.

The collection of these laws in the Office of the Inspector General of Police commences only with the year 1859, but is complete from that date.

It is clearly the interest and duty of these four departments, to a degree which perhaps does not attach in the

case of other departments of the public service, to possess complete collections of the laws of the Colony as issued by authority. If their collections are so fragmentary, what is likely to be the state of the case in other public offices whose needs in this respect are not so general and pressing? And still more likely to be deficient in the possession of an authoritative copy of the statute laws are private offices and counting houses and, in a yet greater degree, private individuals.

But, if the Legislature has been supine in recognizing and discharging its responsibilities in this matter, it may be readily conceded that its omission of duty has been to a considerable extent supplied by private enterprise. Indeed it may be remarked that, in this matter of the writing and bringing out of books and other publications, there is far more of enterprise and successful effort in this Colony than in any West Indian Colony with which I am acquainted, and one must heartily wish such energy a yet further development. To this enterprise we owe several collections of the local laws. The earliest which I have seen is embodied in a little volume called "*The Demerara and Essequibo Vade Mecum*," which has been kindly lent to me by Mr. J. THOMSON. This work—which would appear to have been the precursor of *The Local Guide*—was printed and published in 1825 by A. STEVENSON, at *The Guiana Chronicle* Office, Georgetown. It contains, with other interesting matter, a selection of the laws which were then known to be in force in the United Colony of Demerara and Essequibo.

The Local Guide of British Guiana—the edition of which for 1843 lies before me—contains, in a small and closely printed volume, what purports to be "a complete

compilation of the statute law of the Colony as in force, at the beginning of the year 1843." There is an attempt at arrangement of the enactments according to their subject matter, but it is not easy to discover the principles on which it is based. This *Local Guide* appears to have been issued during a series of years. Beginning as a small 16mo. volume in 1825, it ended in 1864 or 1865 as a thick volume of nearly 1000 pages, published at *The Royal Gazette* Office.

In 1864 a collection of the local statutes was published in one folio volume of 890 pages, by L. M'DERMOTT, at *The Colonist* Office, Georgetown. The compilation was made by Mr. H. A. FIRTH: The scheme of the work is set forth in the following extract from the publisher's preface:—"The plan adopted in arranging the matter of this work will be found in itself most convenient for general reference. The several subjects on which legislation has taken place are arranged and dealt with in alphabetical order, the name of the subject being printed at the top of each page, so that even without consulting an index any subject may at once be found, as in a dictionary, by turning the pages over until the initial letter of the title, and the title itself, of the subject required are reached. The Ordinances which have been passed in reference to each subject are collected under that subject, and given in chronological order, that is to say, exactly as the legislation took place, while the Ordinances or sections of Ordinances repealed or lapsed are duly noted, leaving the text an exact exposition of the law as it now stands. Thus every subject will be found complete in itself, and will exhibit the changes of legislation which have taken place in reference to it from time to time up to the present."

In 1870 a second volume or "Supplement" was issued by Mr. FIRTH, comprising the laws enacted after the publication of the original volume and up to that date. The publishers of this supplemental volume were J. HADDON & CO., of London, and *The Royal Gazette* Office in Georgetown. The size and arrangement of the volume are the same as those of the original work, but while the latter is printed somewhat too closely and in a rather worn type, the former is printed in a large and clear type and with exceedingly wide spaces between the sections. Each volume has a full and apparently well-arranged index; that at the end of the second volume has also the advantage of being an index to the entire work. It may be noted that the titles of Ordinances are omitted in both volumes, and the preambles of Ordinances are generally absent in the first volume.

As it is only within the last few days that a copy of "FIRTH'S Laws" has, by a fortunate chance, been acquired for the Attorney General's Chambers, I am not able to speak of the merits of the compilation from long use, but I believe those merits are generally recognized to be considerable. The work is now, I believe, scarce.

In 1870-82 there was published by L. M'DERMOTT, at *The Colonist* Office, Georgetown, a "New and Revised Edition of the Laws of British Guiana." The work comprises six octavo volumes of text, but if the spaces between the sections had not been made so wide, three or four moderate sized volumes would probably have sufficed. There is also a small volume containing the Index. The enactments are placed in chronological order. The type and paper are only moderate in quality. The name of the editor is not stated, but it cannot be

said that the standard of editorial excellence is high. Thus, the Appendix to the fifth volume contains three documents, one of them being a Placard of the States of Holland extending over 15 pages, which had already been printed in the Appendix to the first volume, and the same Appendix contains no less than four Ordinances which had been omitted from their proper places. In the Address to the subscribers previous compilations of the laws are criticized for their want of accuracy, and it is declared that the work aims at a high standard of merit in this respect. It can hardly be said that the attainment is equal to the promise. It will be found on examination that some enactments which are in force have been omitted, and indeed there is, in the Address already referred to, a frank declaration—which can hardly fail to arouse the astonishment of a constitutional lawyer—that an Ordinance passed by the Governor and Court of Policy was “purposely left out on the ground that it was plainly unconstitutional.”

But, with all its shortcomings, it may be readily admitted that the Government and people of this Colony are under a considerable debt of gratitude to the editor and publisher of M'DERMOTT'S edition of the laws. It is a handy and useful compilation, and, in the absence of an authorized edition, it is the collection which is generally referred to in the Courts of Justice, in public and private offices, and by private individuals.

It is not necessary to make here more than a brief reference to some serviceable collections of the statute laws relating to special subjects, such as, (1) A Handy Book of Village Law, by J. BRUMELL, late Sheriff of Demerara, published in 1873 at *The Royal Gazette*

Office, Georgetown; (2) The Magisterial Law of British Guiana, by ALFRED JOHN POUND, M.A., Barrister-at-Law and ex-Stipendiary Justice of the Peace for British Guiana, published in 1877 by *The Royal Gazette Establishment*, Georgetown, and by J. HADDON & CO., of London; (3) A Supplement to Mr. POUND'S work, published in 1888 by STEVENS and SONS, of London; (4) The Law of Summary Convictions by A. M. ABBOTT, Stipendiary Magistrate's Clerk, published in 1884 by MACRONE & CO., of Glasgow; and (5) A Hand-Book of the Labour Law of the Colony, by CHARLES B. GROSE, Stipendiary Justice's Clerk, published in 1890 at *The Argosy Office*, Georgetown.

Necessity for Revision.

There will perhaps be general agreement with the proposition that the time has now come when a new and revised edition of the statute laws of this Colony should be prepared and put forth under the authority of the Legislature. Some years have elapsed since the publication of the private editions to which reference has been made, and during those years a considerable number of Ordinances have been added to the Statute Book. We have reached the stage spoken of above when the actual condition of our laws is one of "confusion, contradiction, repetition, and disorder." A very large number of Ordinances contained in the editions of FIRTH and M'DERMOTT, and of course a still larger number contained in the original volumes of the laws, have been repealed. The alteration and amendment of Ordinances by subsequent enactments have also been carried out to a considerable extent. The law relating to any given subject of importance will probably

be found spread over a series of years and a large number of separate enactments. It is in consequence not always easy to ascertain what is the existing law on any given point and to harmonize and apply it when it is ascertained.

Suggestions for Revision.

We may then fairly arrive at the conclusion that, to quote again the words of Mr. ROBERTSON, "some attempt must be made to simplify the task of learning the laws by improving their expression and arrangement." It may be pointed out that a private editor has no power to effect such an improvement. He is not armed with the requisite authority to reduce and simplify the involved and cumbrous phraseology of the older enactments, nor is he empowered to combine into one well-arranged Ordinance the half-dozen or more Ordinances relating to any particular subject of legislation. These powers the Legislature alone can supply. And if, as I trust, the question of statute law revision is brought before the Legislature at an early date, it will be for them to determine whether such revision shall be undertaken, and, if so, the lines upon which it shall proceed. It seems to me that two courses are open to them. They may either direct that an entirely new draft edition be prepared, in the form of a logically-arranged and complete code of statute law, such edition to be printed and submitted for their consideration in the same way as a new Bill on any subject on which it is proposed to legislate, or they may direct that a new and revised edition of the statute laws be prepared and published as law without their further intervention. In either case a special Ordinance will be required for the appointment

of a compiler, for defining his powers, for regulating the course of procedure generally, and for giving legal sanction to the new edition when ready for issue. To take the former of the two courses will be to incur a considerable expenditure of time and money, and to make a serious call upon the energy and patience of the members of the Legislature. But, on the other hand, the result would more than compensate for these sacrifices, and would redound very greatly to the credit of the Legislature. We should then indeed have a Statute Book of which we might well be proud, and instead of occupying the rearmost or almost the rearmost position among British possessions in this regard—it is only two or three months since I had a letter from the Librarian of the Colonial Office drawing my attention to this fact—we should go *per saltum* into the front or almost the front place. I fail to see why the Legislature of British Guiana should not achieve what has been done by the Legislatures of the United States and Canada and has been in part accomplished by the extinct Legislature of Tobago.

But if our legislators should shrink from entering upon what must in candour be described as a formidable undertaking, it is sincerely to be hoped that they will sanction the lesser work of the preparation and publication of a new and revised edition of the statute laws of the Colony. For this purpose the compiler should be furnished, by the special Ordinance making provision for the inception and carrying out of the work, with large but carefully defined powers of simplifying the language of enactments and of consolidating all Ordinances *in pari materia*. By way of showing the terms in which such

powers may be compared, there are printed in an appendix to this paper two sections from the Statute Laws (Revised Edition) Ordinance, 1887, of St. Lucia—the Ordinance under which the new and revised edition of the laws of that Colony, which has been already mentioned, was completed. The former of the two sections, it will be seen, gives the compiler, or the Commissioner as he was called in that Ordinance, extensive powers of dealing with the form and method of the laws, while the latter restrains him from making, of his own motion, any alteration or amendment in their matter or substance. At the same time this section indicated a way in which such alterations or amendments might be effected. It is, of course, obvious that the powers specified in the two sections are independent of one another, and that the power of formal revision and consolidation might, if it was thought desirable, be conferred without reference to any power of substantial alteration or amendment.

A new edition, of either of the kinds above-mentioned, need not, I think, occupy more than three or four volumes, of no undue bulk. To these might conveniently be added a separate volume containing existing rules, regulations and bye-laws—a form of legislation on matters of detail which is much affected in this Colony.

It may be said by those whose temperament inclines them *stare super vias antiquas* that if all this is done and we are placed in possession of a new and revised edition of our statute laws, we shall no sooner have it than we shall begin to deface it by the introduction of alterations and amendments. But the answer to this must be

that, if such an argument were to prevail, there would be an end to statute law revision everywhere and at all times, for there can necessarily be no assurance of finality in legislation, and a measure which, at the time of its introduction, seems wise and well-considered may in a short time be found to be futile and unworkable. It may further be urged, and in my opinion it is the simple truth, that the present chaotic condition of our Statute Book constitutes a serious inconvenience to the community at large, and that its re-issue in an improved form will conduce to the social and political advancement of the people of the Colony.

If a new and revised edition is prepared and published, I would recommend that measures be taken for bringing a knowledge of it home to the general population, by free distribution in some cases and by sale at a cheap price in all. In particular, I would advise that a free copy be supplied to every Police Station and every Village Office in the Colony, and that any person be allowed to have access to it at any reasonable time.

I have left myself no space to speak of the codification of the civil law of the Colony, but, as I have already observed, this is too large a question to be adequately dealt with in an article devoted to another branch of the general subject of law revision. I will only say then that it is much to the credit of the legal profession and of the general public that they should have shown so much anxiety to have such a work undertaken and carried out. And while I entirely concur in this feeling, I am yet of opinion that the reformation of our ordinary statute law is at the present time a work of still greater utility and importance.

APPENDIX.

5. In the preparation of the said new and revised edition the Commissioner shall have the following powers, that is to say,—

(1.) To omit—

- (a.) All Ordinances or parts of Ordinances which have been expressly or specifically repealed, or which have expired or become spent or have had their effect;
 - (b.) All repealing enactments contained in Ordinances, and also all tables or lists of repealed enactments, whether contained in Schedules or otherwise;
 - (c.) All preambles to Ordinances or sections of Ordinances where such omission can, in the opinion of the Commissioner, be conveniently made;
 - (d.) All enactments prescribing the date when an Ordinance or part of an Ordinance is to come into operation, where such omission can, in the opinion of the Commissioner, be conveniently made; and
 - (e.) All amending Ordinances or parts of Ordinances where the amendments effected by such Ordinances or parts of Ordinances have been embodied by the Commissioner in the Ordinances to which they relate;
- (2.) To consolidate into one Ordinance any two or more Ordinances *in pari materia*, making the alterations thereby rendered necessary in the consolidated Ordinance, and affixing such date thereto as may seem most convenient;
- (3.) To alter the order of sections in any Ordinance; and in all cases where it is necessary to do so, to re-number the sections of any Ordinance;
- (4.) To alter the form or construction of any section of an Ordinance either by combining it in whole or in part with another section or other sections, or by dividing it into two or more sub-sections;
- (5.) To transfer any enactment contained in an Ordinance from such Ordinance to any other Ordinance to which it more properly belongs;
- (6.) To divide any Ordinance, whether consolidated or not, into parts or other divisions;
- (7.) To add a short title to any Ordinance which may require it, and if necessary, to alter the short title of any Ordinance;
- (8.) To shorten and simplify the phraseology of any enactment; and
- (9.) To do all other things relating to form and method which may be necessary for the perfecting of the said new and revised edition.

6. (1.) The powers conferred upon the Commissioner in the last preceding section shall not be taken to imply any power in him to make

any alteration or amendment in the matter or substance of any Ordinance or part of an Ordinance.

(2.) Subject to the provisions of sub-section (4.) of this section, in every case where any such alteration or amendment is, in the opinion of the Commissioner, desirable, the following procedure shall be observed, that is to say,—

- (a.) The Commissioner shall draw up a memorandum setting forth in a concise form the proposed alterations and amendments, and shall submit the same to the Governor ;
- (b.) After the Governor has considered the said memorandum and has made such additions thereto and alterations therein as he may think fit, he shall cause a copy thereof to be furnished to every member of the Legislative Council ;
- (c.) At a convenient time thereafter the said memorandum shall be laid before the Legislative Council in Committee, who shall have a full opportunity of considering and discussing the same, and the said Council shall deal with the same by way of addition, omission, or alteration, as it shall think fit ;
- (d.) After the said memorandum has been dealt with by the Legislative Council, it shall be transmitted to the Governor-in-Chief, who shall have power to order that it be referred back, as often as may be necessary, to the Legislative Council with such directions with respect thereto as may appear to him expedient ;
- (e.) The provisions of the last preceding paragraph shall, *mutatis mutandis*, apply to Her Majesty's Principal Secretary of State for the Colonies ; and
- (f.) When the said memorandum has been finally settled, the alterations and amendments of law thereby directed to be made shall be duly embodied by the Commissioner in the Ordinances to which they respectively relate.

(3.) Any memorandum of proposed alterations and amendments may have reference to one Ordinance or to more Ordinances than one.

(4.) In any case where an Ordinance, whether consolidated or not, requires such considerable alterations and amendments as to involve its entire recasting, the Commissioner shall prepare a fresh draft Ordinance, which shall be submitted to the Legislative Council and dealt with in the ordinary way.

The Necessity of Pure Air for Health.

By E. D. Rowland, M.B. (Edin.)



THE well known metaphor of one of our learned men of the day comparing life to a game of chess in which each individual plays one side and nature the other, is perhaps best of all appreciated when applied to the laws that govern healthy living. For there we see most perfectly the just but unrelenting course nature pursues: no slip, be it from ignorance, from neglect, or from deliberately taking the chance in the hope that the disobedience will not be found out, is ever overlooked. Nature plays her side of the game regardless of the consequences. Equally with the man on whom the fate of a nation or family depends as with the most insignificant animal in the world, disobedience of the law is punished, and as a rule the punishment is swift and immediate. But, on the other hand, we can repose securely in the knowledge that no advantage will be taken of us; the game is played without favour, fairly and honestly. Thus by obedience each and all of us may easily secure health, and so be fitted to play our parts on this stage well, to the advantage of the whole world; so that it may be a little better for our having lived in it.

It is to the attainment of health by obedience to some of the primary laws of nature that I wish to especially draw attention. These primary laws of healthy living have been formulated for the most part as the result of years of observation and study by men working in Medical

science in its widest aspect in all parts of the world, and to which busy workers in other walks of life not having noted what has been laid down from time to time, have not attached much importance. There have been many attempts to define "health" and all are open to various objections, but the definition that is perhaps the simplest for my purpose and open to least objection is "That state of body which enables it to perform every function which can reasonably be required of it, to accomplish each ordinary task and be equal to some exertion of brain and muscles without painful sense of fatigue."

It is how to maintain this condition from early childhood to old age that we have to study. It is readily understood that though the general principle is the same all through life yet the details vary somewhat according to age. For example, an infant, say two or three months old, requires perhaps as much as twenty hours sleep each day, while an ordinary man, even working hard, will only require something like nine hours at the most, and many are able to enjoy perfect health with only seven or eight. My remarks will be confined to the conditions for healthy living for a man between 25 and 35 years of age principally, though I shall have to speak of special conditions required on either side of the limit.

The body of such a man is one large wonderful chemical laboratory for the production of energy, either mental or muscular, which can ultimately be resolved into heat, one of the commonest forms of motion. Given such a body free from hereditary defect, what are the conditions of the environment necessary for it, to maintain it in its most perfect working order (health),

so that the highest value (return) may be obtained from it? There are of course many, but the primary one of all is proper Food.

And this for convenience may be divided into—

1. The Oxygen *i.e.* the air we breathe .
2. The water we drink
3. The ordinary food stuff we eat.

There are many other ways of classifying foods, as every one is aware, but this is the most suited to my purpose, and in this paper I only wish to draw attention to the first division as given above, reserving the other two and some other general conditions of the surroundings, such as clothing, sleep, work, and so on, to some future occasion. Pure air is the first necessary food for us all. That air is absolutely required for the maintenance of animal life is commonly known; but the further essential that it should be pure, if healthy living is to be obtained is far from being as widely appreciated as it should be. We all know that deprived of air (oxygen) human life ceases in a few minutes—even the pearl-divers of the East, men trained to do without air for comparatively long periods, only stay about $4\frac{1}{2}$ minutes under water; but do we all thoroughly understand what the effect of breathing impure air, even for a short time, is? I think not, and few there are who truly appreciate the effect of long continued breathing of a vitiated atmosphere.

Oxygen exists in the air around us in the proportion of one volume to every five of air. The other four volumes being of the gas nitrogen, which from our present point of view only plays the part of a diluent, so that we may have the oxygen in the proper strength

to breathe. From direct observation, it has been proved that any diminution in the quantity of oxygen is followed by grave symptoms, and also that the human body is not adapted to breathe any increase in the proportion without discomfort.

By exact analysis air has been found to contain—

1. Oxygen, by volume	...	...	...	20'94
2. Nitrogen	...	...	...	79'02
3. Carbonic acid gas	...	...	...	'04

4. Water. In varying quantities depending principally on the temperature. In this colony there is always a large quantity, the difference in the dry and wet bulb thermometers being slight.

5. Ammonia, in the form of carbonates, chlorides and sulphates.

6. Ozone, an allotropic form of oxygen, and to which the stimulating properties of the air are attributed. The amount varies very much, being small in quantities in towns, and large on mountains and at sea.

7. Salts of sodium, which are found every-where.

8. Pollen of grasses and flowers. Here when the cane arrow is drying, I have noticed small pieces of the plume in the hospital wards, brought from the cane fields to windward of the town.

9. Dust of all sorts, as can be seen at any time in a dark room in the beam of sun light, thrown through a chink in the shutter.

10. And from time to time under special conditions, various other foreign bodies are to be found, as for instance, sand at sea, a distance of 600 miles from land.

11. Finally also, at times, organic impurities of various kinds, both living and dead. These vary very much as

to quantity, but bear a direct but unestimated relation to the density of the population.

Excepting the last mentioned, the list given includes all the usual constituents of pure air, and as long as we only breathe this mixture, we shall avoid a considerable number of diseases and shall be under proper and natural conditions in regard to our first food. And this is done by most animals; but immediately a tribe is formed and human beings begin to be massed together in villages and towns, immediately civilization requires buildings, constructed, as they must be at first, without any scientific knowledge of what is meant by pure air, or how it is to be obtained; then organic impurities of all descriptions are added in various proportions to the air, and not being diluted and destroyed rapidly enough, produce disease and death.

The standard composition of the air as given above is principally maintained by what are known as the laws of diffusion of gases, influenced by the temperature and winds which produce a perfect mixture. The trade-winds which affect us here, are usually said to be due to the movements of the earth on its own axis, together with the air at the equator being hotter than at the poles, and so constantly rising, a vacuum is formed into which cold air rushes. To show how little variation there is in the principal gases of the air, I need only quote from SMITH'S work "On Air and Rain," who gives the oxygen in usual air as 20·96, in mountain air as 20·98 and in towns as from 20·90 to 20·87. In a crowded street of Manchester, he found from 20·868 to 20·179 per cent. of oxygen. In open spaces in London 20·95 per cent. was found, and in the crowded East End

of London only 20·85 per cent. From this it can be at once seen how slight the variation is, and how well the difficulty is overcome by natural forces. The constant movement of the air just referred to also allows the oxygen to come in contact with and destroy by oxidation a large amount of the organic matter given off from the lungs and skin of man and other animals. The amount of carbonic acid gas present is also maintained at the uniform level by the same laws of diffusion which allow it to come in contact with the vegetation of the earth, to which it is one of the important foods. And here I may mention the wonderful adjustment that exists between the animal and vegetable world, which alone allows animal life to continue on the globe. The chemical changes in the animal and the products of animal organic matters ultimately resolve themselves into carbonic acid, water, earthy salts and nitrogenous compounds of a more or less complicated nature. As I shall show later on that these nitrogenous compounds and carbonic acid gas are poisons to animal life, it is necessary that they should be destroyed in some way, *i.e.* changed, for matter cannot be destroyed. Now it has been demonstrated that the vegetable world plays this important part in nature's economy. For the chemical changes in the vegetable kingdom resolve themselves into the formation of oxygen, given to the air by the leaves, hydrogen, non-poisonous nitrogen compounds, starches and sugars (carbo-hydrates) and earthy salts. The following tabular view by DUMAS points out the contrast and antagonism between the processes of animal and vegetable life, and shows the mode in which they are made mutually subservient to

each other and how the existence of one is impossible without the other, so co-related are they :—

An animal is an apparatus of combustion or oxidation	A vegetable is an apparatus of reduction or deoxidation
Possesses the faculty of locomotion	Is fixed
Burns Carbon	Reduces Carbon
" Hydrogen	" Hydrogen
" Ammonium	" Ammonium
Exhales Carbonic acid	Fixes Carbonic acid
" Water	" Water
" Oxide of Ammonium	" Oxide of Ammonium
" Nitrogen	" Nitrogen
Consumes Oxygen	Produces Oxygen
" Neutral nitrogenous matter	" Neutral nitrogenous matter
" Fatty matter	" Fatty matter
" Amylaceous matters (starches)	" Amylaceous matters
" Gums and sugar	" Gums and sugars
Produces Heat	Absorbs Heat
" Electricity	" Electricity
Restores its elements to air and earth	Derives its elements from air and earth
Transforms organised into mineral matter.	Transforms mineral into organised matter.

In short the atoms of the elements are in a state of perpetual change from animal to vegetable and back again from vegetable to animal. It is a marvellous arrangement.

The genius of England's great poet soared high indeed into the realms of advanced physical science, but probably unknowingly, when he makes HAMLET say :—

Imperial Cæsar, dead, and turned to clay,
Might stop a hole to keep the wind away.

And one has no doubt that some of the atoms that have kept the world in awe have come to serve the useful purpose of patching walls to expel the winter's flaw. So also in Scene III Act IV of the same play, HAMLET

has a clear idea of the transference of the atoms of the element.

We have seen what the air is composed of, how this composition is maintained, and I have mentioned that this equilibrium is disturbed when numbers of human beings are crowded together in houses, villages and towns. But this last requires to be dealt with in some detail; a more exact description of these impurities, both as to quantity and quality, is necessary. A fuller statement of the diseases produced must be made, and we must study the methods by which in this colony the standard purity of the air may be maintained so that the conditions laid down in the beginning may not be violated. It is to this problem of maintaining the air (oxygen) undefiled that sanitarians have devoted a great part of their time. In the Northern countries it is the commonest as well as the most difficult problem. It meets one on every side, involving as it does all the larger surroundings of man, from the proper arrangement of street, the proper building of houses, (even to the details of the materials used), to the minutest points of house cleaning and removal of refuse. But we, living in the tropics, have the problem in some ways much simplified from the fact that the temperature is comparatively a constant one, so that no provision is required for warming the air before breathing it, and that the wind blows for the greater part of the year from one quarter of the Compass. Hence all we have to do is to put a sufficiently large inlet on the windward side of our houses, and an outlet on the other, in order to permit the natural method of ventilation to come into play.

From direct observation on man in health it has been

shown that respiration is carried on by the lungs for the great part, and to a lesser extent, but still one of great importance, by the skin. In ordinary lung respiration the oxygen is taken from the air in exchange for the carbonic acid added to it with a trace of nitrogen, ammonia, a large quantity of water and other bodies. This is the exact analysis.

<i>Unrespired dry Air.</i>		<i>Expired Air.</i>
Oxygen	... 20'94	16'033
Nitrogen	... 79'02	79'02
Carbonic Acid...	'04	3.3 to 5.5
		Ammonia, a trace.
		Water.
		Organic matter.

This interchange of gases goes on continuously, and in 24 hours amounts to the consumption of 744 grammes of oxygen and the excretion of 900 grammes of carbonic acid which measures from twelve to sixteen cubic feet (at ordinary pressure and temperature) of gas per diem or .6 cubic feet added to the air per hour. Males from eight years onwards to old age, give off more carbonic acid than females, and as might be expected from a study of chemistry, muscular and energetic persons use more oxygen than the less active. The amount of carbonic acid gas excreted during sleep is diminished by about a fourth and it is stated the quantity of oxygen consumed is increased; but this is open to question.

The excretion of water varies a good deal, amounting from the lungs and skin together to as much as from 25 to 40 ounces in 24 hours. It is subject to great variation depending on the work done and the temperature of the surrounding medium.

From the skin, 10 grammes of carbonic acid with an undetermined quantity of various salts and organic matter are excreted. The same weight, 10 grammes, of oxygen is given as the amount absorbed by the skin. This total amount of carbonic acid (910 grammes) requires 72,000 cubic feet of fresh air for its proper dilution and the water (25 to 40 ozs.) a varying quantity depending on the hydrometric condition of the air, and the temperature.

Organic matters are also given off from the lungs, mouth and skin, comprising dead epithelium, fatty and other matters, but the exact quantity has never yet been accurately determined. The organic matter from the lungs is the most important, of which the following is known. It is a nitrogenous and oxidisable body with an offensive odour. It commonly floats in clouds and is not a gas, but has a molecular formation. It is highly poisonous, for administered to a mouse, PARKES states that it killed in 40 minutes. It is this that makes a room, a bedroom more especially, offensive and stuffy. If respired air be drawn through water, the water then set aside for a few hours, a most offensive odour is developed, due to the organic matter absorbed by the water from the breath. If this organic matter be burnt it gives an odour as of burning animal matter.

Taking '04 as the quantity of carbonic acid gas normally present in ordinary air, it is found that when it is raised to '06 by respiration in a room, the odour of organic matter becomes perceptible to all entering from the open air. This added '02 of carbonic acid must be taken, and is taken by sanitarians, as the limit of allowable impurity. In order that this limit shall not be

exceeded, it is necessary that 3000 cubic feet of fresh air be supplied to each person inhabiting a room per hour. The organic matter excreted has been found to be in direct ratio to the quantity of carbonic acid gas, so that by watching the amount of this gas in the air we can prevent the organic matter accumulating in our rooms. So the simple rule has been laid down that we should keep inhabited spaces in such a state that a 19½ oz. bottle full of its air shaken with ½ an ounce of clear lime water gives no precipitate, or, put in other words, that the carbonic acid gas is not in such quantity as to combine with the lime to form sufficient carbonate or common chalk to be visible. Immediately the proportion of .06 of carbonic acid is exceeded the precipitate becomes visible. By the odour of the organic matter, only perceptible to one entering from the fresh air, we always have a rough but very reliable test for the amount of the carbonic acid gas. If we can smell organic matter we know we have excess of carbonic acid present; and if on testing, as given above, we can see a white cloud form in the lime water, we know we have too much organic matter. In either case, at once, additional means of ventilation should be provided. Further, if a room is used continuously at night, allowance must be made for the impurity arising from the lights used. An ordinary lamp for example produces a little more than half a cubic foot of carbonic acid in an hour, and for the complete combustion of one pound of oil, from 140 to 160 cubic feet of air are required. We fortunately here have few factories, so that our air is free from many impurities found in manufacturing towns of Europe, such as compounds of sulphur, chlorine, nitrogen and phosphorus. We get

no fogs from the large quantities of unconsumed carbon compounds poured forth from millions of chimneys as in London. And we are not much troubled in our houses with foul gases from sewers, so I do not discuss them here. But I wish to draw attention to the air in the lanes and some streets of the towns which can be verified by any one on passing through them, especially on a still night. The air is simply laden with gases resulting from the decay of organic matters of all descriptions which are emptied into the yards, equally from the bedrooms and the kitchen, through the nearest opening. These gases of course penetrate into the sleeping apartments of the neighbouring houses and produce ill effects. The Enteric fever of some of the poorer parts of Georgetown have been attributed by Dr. FERGUSON to this. This source of impurity should be remedied by the adoption of a proper system of refuse removal. Another source of impurity to the external air is to be found in the emanations from stables and sheds, in which horses and cows are stalled. The air is often loaded with ammoniacal and other gases from the decomposition of the excrement. The ground in some yards is covered with such refuse, and the gases pollute the air for some distance around. This might easily be avoided at all events to some extent by the proper authorities insisting on cows being kept without the town, and on horses' stables being placed in least harmful positions.

In inhabited rooms by an arrangement of proper apparatus the air can be filtered and the deposit examined microscopically. This has been done repeatedly with the result of showing the presence of the epithelial scales of the skin, fibres of cloth, cotton, linen, and wool,

particles of food as bread, particles of hair and even the spores of certain diseases in special cases. For these also the remedy is more fresh air.

PARKE says "The importance of pure air cannot be "exaggerated for of all causes of death in usual action "none is so potent as foul air." Not only does it produce disease of itself but it reduces the general condition of the body and so predisposes to all diseases. That the death-rate and the density of population (impure air) are related, is as firmly established as any other fundamental principle of sanitary science. In towns and habitations if the density of the population is high, there is always a high death-rate, and this is not for one disease alone but for all diseases. The dire effects of the Black hole of Calcutta, and the deaths of 260 out of 366 Austrian prisoners taken at the battle of Austerlitz and confined in a small space, shew how fatal impure air is in a startling manner. The supply of oxygen was diminished, and the people were poisoned by the organic matter given off from each other's lungs and skin. It is rarely that the world is startled by such shocking atrocities, but, after all, the atrocity is one of degree only, and the world, I suppose from ignorance and unbelief, for the most part, looks calmly on while about one-fourth of its deaths are caused by impure air. In the Black hole of Calcutta 146 persons were confined in one small room, with only space to stand and a small window for admission of fresh air, for one night, and of these 123 died before morning and many of the survivors succumbed to putrid fever. HOWARD'S work, one hundred years ago, resolved itself into obtaining fresh air for prisoners. So frightful was the result of its impurity that prisoners,

jailors, court officials and barristers suffered alike from "Jail fever" with a mortality that was awful. Jail fever has quite gone from prisons now; the name has almost gone and only a few cases of this fever are found annually at home now. These of course occurring in the dirty ill-ventilated parts of large towns as Dublin, Glasgow and Manchester. There is little doubt that this disease, Typhus fever, will, sooner or later, like the Black Death and Plague become a thing of the past, and one more conquest over disease, one more step in the glorious march to relieve human suffering will have been made by sanitarians.

If we breathe air for any period vitiated by animals to the extent of containing more than '06 of carbonic acid gas and the proportionate amount of organic matter, often distinct febrile symptoms will be produced, lasting some hours perhaps. This is beyond doubt, though when Dr. WALLBRIDGE read a paper on ventilation some few years ago, his statement, from his experience, that coolies sleeping in ill ventilated ranges came to hospital with fever, was ridiculed. All of us have had the experience of breathing foul air, at a play or concert for instance, and we have all suffered more or less the next day from headache, have not felt quite so well as usual, not quite so ready to go to our work. Many of us have perhaps not known why it was, but there is no doubt that it was due to breathing air laden with more than '06 per cent. of carbonic acid gas and a proportionate amount of organic matter. If a few hours will produce such discomfort, what must be the result of a continued exposure?

Formerly some 50 years ago all authorities were agreed

that there was no such thing as phthisis in the colony. My experience in the hospital Georgetown has quite convinced me that it is now one of the prevailing diseases, and this opinion is further confirmed by my work in the New Amsterdam Public Hospital, where I have found no lack of phthisis.

Here are some of the figures from the Hospital Registers of Georgetown :—

In 1886	there were	758	deaths,	of these	206	or	25'8	o/o	were	due	to	phthisis
„ 1887	„	972	„	„	279	or	28'5	o/o	„	„		
„ 1888	„	1000	„	„	250	or	25'	o/o	„	„		

And of the cases treated to a termination in 1886 there were 7,594 indoor patients, of these 836 suffered from phthisis or one ninth of the total diseases, and in 1887 there were 9,879 patients with 845 cases of the same disease. And in one year out of 418 autopsies, consumption was found in a more or less advanced stage in 120 cases or 28 per cent.

Dr. FERGUSON has written a very full paper on the growth of phthisis in this colony, and going back to 1847 he found that in that year there were 8,296 admissions into the Public Hospital, Georgetown, with 683 deaths and of these only 14 due to phthisis or a percentage of 2'04. What a difference ? Then 2'04 per cent. now 28'5.

In the same paper he pointed out the influence of city life—that is, over-crowding, that is impure air in its production, and showed that of every 100 cases of phthisis, 62 were town inhabitants.

The mortality of the world from consumption may be taken at 3 per thousand and in one of the Registrar-General's Reports 2 per thousand is given as the rate for this colony, but this is much lower than it truly is, due

no doubt to bad registration. From a careful analysis of the figures I have found 7.5 per thousand to be the approximate number of deaths in Georgetown due to this disease. This is as high a rate as occurs in any part of the world and is a terrible number when it is remembered that it is a preventable disease, the main factor in whose production is over-crowding and impure air. Georgetown is over-crowded, as crowded as London in some parts. In Georgetown there are from 50 to 53 persons to each acre of land so that each person has only 96 square yards of ground space. The mortality varies from 28 to 32 per thousand per annum. In London in places with 32 square yards for each person, the mortality is 27.7; with 102 square yards the mortality falls to 24.5 and with 202 square yards per inhabitant, the death rate only reaches 20 per thousand.

Phthisis, as I have said, has now come to be recognised as a preventable disease caused principally by over-crowding; other factors no doubt aid in their own way, but impure air is the main one. This has been demonstrated beyond question over and over again from the Equator to the North Pole, so that I need only give one illustration and it is a characteristic one. In a badly ventilated prison in Vienna 378 prisoners died in one year out of a total of 4,280 inhabitants. This is a mortality of 85 per 1000, and of this number no less than 51 per 1000 died of phthisis. While in the well ventilated House of Correction in the same city in the same year and under the same general condition as regards other foods and so on, only 43 died out of 3,037 prisoners or 14 per thousand, and of

these only 7.9 per 1,000 were from phthisis. What a contrast?

So also in animals can the effects of impure air be proved. As for example in the Old French Cavalry there was a mortality of from 180 to 197 per 1,000 horses annually but by enlarging the stables, increasing the ration of pure air, it was reduced to 68 per 1000. There was a similar experience in English Cavalry Barracks: now in the new stables the mortality is only 20 per 1,000, and of these, half are due to accidents. Such diseases as glanders and farcy are looked upon as due to neglect. So important is fresh pure air considered now for horses, that it is brought, in properly constructed stables, directly under the animal's head so as at once to dilute the products of respiration. Curious, is it not, to think that such diseases in horses are looked upon as due to neglect, while out here deaths in man produced by comparable diseases, inasmuch as they are preventable, are assigned to occult influence beyond control. One, is told if you are to die, you will die; and during the late epidemic of measles that has raised the death rate very much all through the colony, little or no attempt has been made to check the spread of the disease by isolation. And I have known cases where the spread of the disease through a family has been encouraged because it is better for children to "get it over." I am told. Such awful heresy is fatal to true progress. No disease can be stamped out while this idea prevails.

In England the annual death rate from phthisis has been reduced during the last 30 years by one-third, and this is due entirely to an improved knowledge of what is meant by pure air. The ventilation of houses has been

vastly improved, bedrooms are now made airy, the old four poster bed with its heavy curtains and tester has quite gone. Wide streets have been and are still being made in all the large cities, at what appears to be a ruinous cost, as for instance, London, where houses are sold for enormous sums of money simply to be pulled down so as to widen the streets. Large open spaces are being made into gardens by the governing bodies of all towns, at a heavy expenditure often, so as to give pure air to the inhabitants. Trees are being planted wherever possible in the street, so that the carbonic acid gas and organic matter poured into the air may be rapidly consumed and the health of the town increased. Perhaps one of the most hopeful signs for the further reduction of the mortality is to be found in the keen discussion that continually goes on now-a-days as to the mortality statistics of towns. In England there is a sharp competition to stand at the head of the Registrar-General's Quarterly Returns. It is commonly said that we here are much behind the times, yet this is not altogether correct. More especially of late years, one has from time to time with pleasure noticed an effort to improve the condition of the environments of the poor people. The action of the Children's Protection Society and Mr. GIBSON'S erection of "Model Dwelling Houses" are both well marked attempts to give the people pure air.

In the colony it is curious how it has come about that the mortality should owe its severity to such a disease as phthisis, for in the day time all classes live more or less in the open, few being in offices or houses, and these even are so well ventilated by large windows, with perhaps the exception of some rum and retail provision

shops, through which blow the steady trade-winds thus preventing any impurity of the air. But when we come to examine the sleeping apartments we are astonished at builders putting no proper bedrooms in the houses, and no proper ventilation in the few that are allowed. There are few houses, even of the wealthy, that have proper bedroom accommodation, and certainly there is not one of the poorer classes with any thing like what ought to be. Even the small cottages that the better class workmen erect for themselves are sadly deficient in ventilating openings. The vast majority of the labourers live in ranges or cottages closely packed in yards, the ground of which is covered and infiltrated with every form of house refuse, and giving off gases similar to those of sewers. The ranges are without windows, there being only a door and some spaces closed by shutters. There is no ventilating opening in the roof or under the eaves in any one of them. At night these shutters are closed, and the floor space often the only limit to the sleeping accommodation. My work has called me to some such places both in New Amsterdam and in Georgetown, and I have been astonished at the number of people who fly before the doctor from the room where they had evidently been, and have always noticed the stuffy foul air due to organic matter on entering the house.

The proper floor space for every sleeping person is about 100 square feet, and the cubic capacity ought to be about 1000 feet with means for changing the air three times in each hour, if we are to keep within ('06 per cent. of carbonic acid) the limit of allowable impurity.

There is, I am always told, great danger in the night air, but I have never been given any proof. I do not

mean a bare statement, I want scientific proof with properly authenticated data. On the other hand I have abundant proof, some of which I have already given, of the dangers of sleeping in over-crowded, badly ventilated rooms. I do not say sleep in the direct draught of the air but I maintain, to sleep properly covered in flannel garments and a blanket, with several windows open, will do no harm, nay will positively do good, for only under such conditions is sleep nature's sweet restorer. But with closed windows one perspires freely, one breathes foul air, awakens with a dull heavy feeling, more exhausted than on going to bed. Night air is not dangerous if proper precautions are taken.

In this connection I wish particularly to draw attention to a most objectionable way of sleeping, I regret to say, commonly practised by the people here, due no doubt, to the presence of the mosquito. I mean sleeping with the arm bent over the head and face as a guard, and then covered with a sheet or blanket. The inner side of the covering soon becomes laden with moisture, and for hours the person is breathing air that has only just passed out of his lungs, containing a diminished quantity of oxygen and loaded with carbonic acid gas and organic matter. The person is self-poisoned, reduced in health, rendered less able to resist disease. The lungs are weakened, so becoming more liable to be inflamed and the individual wakes unrefreshed day after day.

So also children and others in double beds should not sleep face to face, for then they breathe air that has only just passed out of each other's lungs.

In this colony the mortality per 1,000 has varied from 32 to 25 per annum in the last few years.

In England it is now 17·9. In London 17·9. In large towns 19, and in Nottingham it is as low as 14. In Australia the mortality varies from 17·7 in Queensland to 12·4 in New Zealand. These figures I mention to show how much yet has to be done to bring the health of the colony to anything to be compared with what exists elsewhere. We must not listen to the voice of the charmer who will at once whisper "can't" in our ears. The reduction of the mortality is a matter that concerns every one and only by facing it will the difficulty be overcome. It can be done, and sooner or later will have to be done; and the sooner it is done the more cheaply will it be done. See what a difference, here the mortality is 30, in England only 19. Eleven lives to be saved per thousand per annum to put us level with England. Eleven lives does not seem many but multiplied by 282 (thousand), the present population of the colony it means 3,000 lives saved to the colony which taking the cost, \$80, of importing a coolie, as the value of a man (this is not the true economic value of a man but it is the only one I can find here), means a saving of \$240,000 a year. As Sir SPENCER WELLS has only recently said in an address on the Health of the Nation delivered at Manchester, a low mortality is only a matter of sanitary administration. And if we can only get phthisis as a cause of death removed, the mortality would come by this alone to range from 25 to 18 per thousand. This disease would soon disappear did we all breathe pure air. That these ideas are not Utopian I may draw attention to what has already been done in the colony, and for the figures I have to express my thanks to the Surgeon-General.

Mortality of Indnt'd Immigrants on Estates per 1000.		Mortality of General Population per 1000.
1885...	... 25'3	29'52
1886...	... 27'4	25'86
1887...	... 23'2	32'41
1888...	... 19'7	29'27
1889...	... 12'5	28'13

Here the death rate in a population of 20,000, scattered in groups from one end of the inhabited part of the colony to the other, has been in a few years reduced by about half, by simple attention to the proper rules of sanitary science. And on enquiring what has actually achieved this, one finds that it is mostly by giving the coolies pure air. The ventilation of the ranges has been much improved, by cutting a hole here and there, by putting in jalousies and in some places by erection of new ranges from time to time with proper openings for perflation. The hospitals have been modified to the requirement of our better knowledge and patients consequently stay in them fewer days. Put in another way, it can be stated thus : in 1885, out of every 1,000 indentured coolies 25'3 died ; in 1889 (only 4 years after) 12'5 only died, giving a saving in that year of 13 lives per 1,000. This is 260 lives in the year valued at \$20,000. It is to be noted that this result has not been obtained by the expenditure of large sums of money, for I am told that a liberal estimate for the alterations in the buildings would be much less than the monetary value I have given to the lives saved. And if such a result can be achieved under medical guidance on the estates of the colony, surely in the towns and villages it can be done also. That this is so is further shewn, if it is required by the past history of the West Indies.

Let us go back to some 50 years ago. Then the people were properly housed and the death rate was comparatively low, while in the barracks where soldiers were living the death rate was terrible. Phthisis and chest diseases together with fevers carried off men and officers at the rate of a regiment 1,000 strong in five years, and sometimes in a single year as many as 300 would die. In the barracks where this happened the men had only $22\frac{1}{2}$ square feet of floor space and 250 cubic feet. Now this has been altered; the men are allowed 100 square feet and 1,500 cubic feet with the result that there is little or no death rate amongst the troops,—it being as low as 6·6 per thousand while there is no lack of sickness from malarial diseases. The sickness rate being as high as 1,380 per 1,000 strength.

In short then the people lived in good houses and had no phthisis, while the soldiers lived in bad barracks and had a high death rate from this disease. Now the soldiers live in properly built barracks and have no death rate, and the people live in badly ventilated houses and have one fourth of their deaths from a preventable disease.

Malarial poison also is said to exist in the air and will give rise to its diseases under certain conditions.

Diarrhœa and Dysentery are also produced by impure air where there is much over-crowding, but impure water has more influence in these cases.

Measles, Small-pox, Typhoid, Cholera, are also from time to time claimed as spreading through the air but the evidence for the most part is defective. Such diseases as Mumps and Influenza spread by the air but even here proximity is required.

There are also at home various trade diseases pro-

duced from the impurity of the air in the factories, but these do not need remark here. Finally the impure air when it does not produce disease reduces the general vigour of the body and renders it more liable to diseases of all kinds and to the more fatal type of each disease.

Air is subject to the laws of gases, so inequalities of temperature cause movement, the hot air ascending and cool air coming in from without, but here where the air in bedrooms is about the same temperature as outside, there can be no great change from this cause, and further this change does not affect the organic matter much, so other means for good ventilation must in the colony be used; and the steady blowing winds help us here, for all that is necessary is to provide a good big *inlet* in proportion to the number sleeping in the room on the windward side and an exit on the other, and the object is achieved. And no better examples of this method of ventilation can be found in this colony than in the institutions in New Amsterdam. Here in the Asylum Dr. GRIEVE banished phthisis as a disease of the institution which he found prevailing on taking charge of it, and this was done by a proper adjustment of square and cubic feet per bed with standing jalousies and openings under the eaves to admit of 3,000 cubic feet of air per bed per hour being supplied in all weather. In the Hospital a similar plan is pursued with benefit, and in the Alms House recently the upper sashes of all the windows have been removed, and since then there have been fewer deaths and no increase in the sickness rate. Here no complicated system for ventilation is necessary, as at home, where not many years ago thousands of pounds were spent in an elaborate scheme for ventilating

the House of Parliament, and which after all resulted in a very unsatisfactory manner. As I have stated above, an inlet under the eaves sufficiently large on the windward side to admit 3000 cubic feet per person per hour and an outlet on the other, give all that is necessary in this climate where the wind blows so steadily from the one quarter of the heavens. This is a natural method of ventilation and is known as perflation. When this is adopted generally then will every one in this colony be living supplied with pure air, the first requirement of human life.

Note—The following would seem to be the lines on which to work in order to get as cheaply and as quickly as possible an improvement in the air.

1. Cows should be banished from the towns and not allowed to be stalled within a definite number of yards of the nearest house.

2. Plans for the erection of houses should be submitted to the various governing bodies, as far as practicable, and this is so for all the towns, and even for some of the large villages.

3. Windows should be insisted on in all human habitations in such plans. The shutters should be forbidden. In ranges a good opening under the eaves must be put in and a "cow mouth" would be advantageous. The eaves can be lengthened a few inches to keep out rain.

4. In laying out a new town or ward, as for instance Bartica or the new ward in Georgetown, a definite limit must be put to the number of houses placed on a lot, so that the state of things that exists in some of the older wards of Georgetown may never arise. The houses must

be placed so that the air can have free access to each one. If the street were placed *en echelon* this is readily attained.


5. No permission to build on already over-crowded lots should be given.

6. Power to condemn any notoriously unhealthy lot or insanitary dwellings should be obtained. Compensation can be made if necessary. This power must be used carefully or a greater evil results.

7. The early adoption of a proper plan of refuse removal. And for the tropics this would appear to be the "Pail System," in spite of all that has been said against it. The Pails to be emptied on to the land and not into the mouth of a tidal river as is done at present in Georgetown. In New Amsterdam all the refuse from the Institution is disposed of in this way with advantage.

Notes on the Geological Reports of British Guiana.

By the Editor.

O much mischievous information about these reports is ignorantly spread by persons, who, not having taken the trouble to carefully read them, perhaps not having read them at all, yet venture to adversely criticise their contents, that it is desirable that some one should publicly refer to the matter in order to correct the misconception that seems to prevail about them.

True the reports are by no means enticingly written, nor is the matter of a kind that lends itself to easy reading or assimilation ; and doubtless these are sufficient reasons for the superficial reader to lay aside the volume with some by no means favourable comment. But this cannot decide upon the value of the work.

Other readers there are again, who have dipped into the pages of the reports, having formed no adequate idea of the task attempted by the geological surveyors, and who are thus quite unable to comprehend what was really accomplished. And yet an outline of this task has been well penned by one of the surveyors in his preface to the reports, as though with an object of giving to readers familiar with other lands, an idea of geological work in a new and trackless region.

“ It can readily be understood that to explore such a vast extent of thinly-inhabited country, equal in size to England and Scotland together, covered with boundless forests, and situated within the Tropics, was at best a difficult and laborious undertaking.

“ The cultivated portion made accessible by roads is but an atom of the whole territory, and lies along the sea coast, so that to explore the interior we had to ascend the rivers in boats, and make walking journeys across country along Indian paths. To penetrate to the utmost limits of the colony it became necessary to make long excursions, sometimes of eight months' duration, upon which, owing to the dangerous rapids and cataracts on the rivers, strong boats with crews of river-men had to be employed, and most of the provisions for our maintenance carried with us. At times, on long walking journeys, we had to depend for sustenance on coarse food procured at the Indian villages passed through on the route. Thus it frequently happened that in places where I wished to stop and examine interesting geological areas, I was obliged to hurry forwards for the purpose of obtaining provisions ; whilst in other parts, comparatively valueless, I was sometimes detained whilst food was being prepared for us. Oftentimes the task of making out the geology of the country was rendered a hopeless one by the dense forests through which we travelled for days together, hiding completely the contour of the country, as well as the outcrop of the rocks.

“ During four months of the year, the rain falls heavily, the rivers are flooded, hiding all the rocks, and the surrounding country bordering them to some extent submerged ; even in the high lands the mountain streams and torrents are rendered impassable.”

As the result of a geological survey, of such a region, and under such difficulties, carried out in the first place, by two men for $2\frac{1}{2}$ years, and then by one alone for a further 3 years, the series of reports

on the different districts, it must be acknowledged, are extremely complete, under the circumstances; and though they can by no possibility be regarded as more than the beginning of an attempt to arrive at an accurate geological history of the colony, yet they lay the foundation for that history, and will serve as a most useful handbook for future work.

“To make an accurate survey would, however,” says the preface “require an immense outlay and occupy three times the number of years already spent on the present explorations.” This, however, in the light of the best surveyed country in the world, Great Britain, would seem to be even more than sanguine; for it was but a year or two ago that gold was declared to be in paying quantities in Wales, and 'tis but now that the existence of a coal formation in the South-Eastern counties is being brought to proof—in spite of the army of surveyors and the number of years that have seen their labours. Such work in a large extent of territory, is necessarily a work of time!

It is upon the existence of gold and precious stones, in paying quantities, in the colony, that the Reports are made to bear the whole burden of complaint; and now that gold is proved to exist in large quantities in certain parts of the land, the contempt with which the surveyors are mentioned is even more marked. In the first “place the surveyors said there was no gold or precious metal in the colony;” and in the second place, now that gold and diamonds are known to exist in the country, “the surveyors ought to have found gold and precious stones.” Such in substance are the complaints.

Now, it seems almost idle to have to say that a geolo-

gical survey is not a gold prospection; though it may often happen that in a survey of a district, it may be possible to prove that gold or other valuables is to be found there in paying quantities. The close and detailed examination of a small district for special minerals, is a vastly different undertaking from the comprehensive survey of a region for the purposes of mapping—to determine the relative arrangement of water, hill and vale, and their component parts, of the rock systems and their included fossils and mineral constituents.

The whole secret of the complaint seems to lie in the want of comprehension of what a geological survey means, and its discrimination from a gold hunting expedition.

But the complaint is, moreover, unjust and false. Consistently with the objects of the survey, the geologists kept an open eye for the discovery of gold; and frequent references in the reports substantiate this, where instead of statements that gold did not exist, they notify its presence or the likelihood of its occurrence, and recommend further investigation.

On page 37, at the close of their report on the North Western part of the colony, after a description of the various schistose, granitic and gneissic rocks and their reference to Palæozoic times, they close with the following. "From their (*i.e.* the rocks) being metamorphosed and pierced by quartz veins, and from their possessing all those lithological characters which are considered auriferous, we regret that our means of supporting labourers with the necessaries of life prevented us from carrying our examinations to the extent we would recommend."

On page 41, in the report on the Cuyuni and Supi-

naam rivers, with reference to alluvial washing, we read "The men who accompanied me had little experience in gold washing, and discovered no gold, but I did, and satisfied myself of the existence of gold in the alluvium. Nevertheless the small quantity obtained would not justify me or any other geologist to proclaim this particular spot or place as a gold field, any more than many other places to be found on this river (Cuyuni)." And further on "I, however, advise further investigation, for it must be understood the Government geologists cannot bestow extensive examinations, which might occupy at least three months instead of four days, or make expensive chemical analysis, required for such investigation, for any private enterprise without express orders from the Government."

On pp. 48 and 70, references are made to places which were thought to be most likely gold bearing. On page 70 in the report on a portion of the Essequibo river and on the Pacaraima mountains, we read, "I examined the quartz veins as thoroughly as I could under the circumstances while on the march, but could not discover any traces of gold in them. Travelling quickly, as I then was, so as to ensure a successful journey, every moment was precious, on account of the little food in this district to be procured for my party, and without which my explorations of the country as far as the Cotinga river would have to be abandoned. Therefore from want of time, I was unable to do more than make a cursory examination of the quartz along the route."

On page 107, at the close of the report on the Rewa and Quitaro rivers, and the country between the latter and the Rupununi, we read, "In all this district examined

there does not appear to be any mineral of sufficient value or in such quantities as to be ever turned to account. I have repeatedly washed in likely looking spots for gold, but was never rewarded by finding a single grain. At the same time, if there is any mineral discovered hereafter over this district, it will be gold, for there is a strong, mineralogical resemblance between the savannahs here and the plains at Caratal in Venezuela, where gold is now being worked."

The above extracts will serve to show the light in which the Government Surveyors viewed their work, and the manner in which they performed it. *Pari passu* they carried on their strictly geological work, and kept themselves alive towards increasing, wherever possible, the knowledge of the mineral wealth of the colony. Their tracks through the great forests and plains and along the river courses, may be compared to but isolated gossamer upon a meadow, and it is hardly surprising that over such an extent of territory, they should have missed those very localities, which have since been proved to be so richly auriferous. The inner districts about the junction of the Essequibo and Potaro, which have lately become so justly famous, were absolutely untrodden by them; and, except in the opinion of a few individuals, who, by their own speech, can do and know everything, it is not surprising that under the circumstances the surveyors did not describe what they could not see.

On Parasites.

By A. T. Ozzard, M.R.C.S., England.



PARASITES may be defined to be "living organisms which derive their nourishment wholly or in part from other living organisms."

Man by his complex organisation affords an easy prey for every kind and variety of parasite: from the extremely minute organisms called Bacteria which occur normally in many parts of the body, up to the more highly-developed, though certainly infinitely more repulsive-looking Tape-worm! All the world over man is infected to a greater or less degree by parasites in some form or another. In the Tropics, however, almost every known (and probably many as yet unknown), variety of parasite seems to congregate for the sole purpose of adding to the many discomforts incidental to human beings residing in such climes.

But man may take comfort (?) in the fact that many parasites are themselves infested with parasites; in the words of the poet:—

" Big fleas have little fleas
On their legs to bite 'em ;
Little fleas have lesser fleas
And so ad infinitum."

Parasites may be divided into the three following great classes:—

1. Parasites of the Animal Kingdom—(Zoo-parasites.)
2. Parasites of the Vegetable Kingdom—(Phyto-parasites.)
3. Parasites of extremely minute organic forms called generally—Bacteria.

The Zoo-parasites may be sub-divided into Entozoa and Ectozoa, the Entozoa embracing such creatures as 'take up their residence in the soft and hard tissues as well as in the cavity of the digestive organs of their human and animal bearers,' such as the intestinal worms; the Ectozoa embracing 'all kinds of parasites having the habit of residing in or upon the surface of the body of man and animals'. Of both these sub-divisions British Guiana, or rather the inhabitants of British Guiana, furnish numerous examples—notably, amongst the Entozoa, being the various worms inhabiting the intestines, such as the *Ascarides*, of which the common round worm (*Ascaris lumbricoides*) is an only too familiar example, the *Anchylostomum duodenale*, chiefly or solely met with in tropical climates, the whip-worm (*Trichocephalus dispar*), thread-worm (*Oxyuris vermicularis*) and the various forms of tape-worms (*Bothriocephalus latus*, *Tænia solium*, &c.). Of the Entozoa which 'take up their residence in the soft and hard tissues of the body,' may be mentioned the Guinea-worm (*Filaria medinensis*) inhabiting the skin and subcutaneous tissues, the *Filaria sanguinis hominis* a minute parasite existing in the blood and associated with certain special tropical ailments, and the *Trichina spiralis* inhabiting the muscles of the body and giving rise to the serious disease called Trichinosis.

The Ectozoa likewise are only too well represented in British Guiana, and although generally perhaps looked upon as more loathsome than their less known confrères the Entozoa, are not capable of producing the extreme ravages to the human frame as are the latter; but at the same time they leave to the un-

educated eye far more clear and reliable evidences of their presence. Of these the most familiar examples are the various kinds of lice (*Pediculi capitis*, *Pediculi vestimenti*, &c.)—the itch-insect (*Sarcoptes scabiei*, or *Acarus*)—and peculiar to certain tropical countries and very well-known to British Guiana, the Chigoe or Jigger (*Pulex penetrans*).

The Parasites of the Vegetable Kingdom may likewise be sub-divided into Entophyta and Epiphyta—and are included under the general term of Fungi, the Entophyta being such as inhabit the alimentary canal and internal tissues of the body, and the Epiphyta those which affect the skin and subcutaneous tissues.

Familiar examples of the Entophyta are the thrush-fungus (*Oidium albicans*) the fungus that produces the disease called Thrush—the *Sarcina ventriculi* often met with in the stomach, the yeast-plant (*Torula cerevisiæ*) also met with in the stomach—and the cotton-fungus (*Chionyphe carteri*) inhabiting the deep tissues and bones in the feet and hands in the disease called Mycetoma or the Fungus-foot of India.

Amongst the Epiphyta are included the various fungi with long names (*Trichophyton*, *Microsporon*, &c.) which are associated with the skin diseases described as “ringworm.”

The third great class (the parasites of extremely minute organic forms) includes those extremely interesting and exceedingly minute organisms grouped under the general term Bacteria, about which so much is being written nowadays, and to whose presence Pathologists have now to look for the fundamental causes of many diseases. “This third form of parasitism is constantly

invading our bodies, and attacking the living protoplasm by which the work of life is carried on in our tissues—they are constantly present to us, constantly mixing up their life with ours. But the same may be said of all parasites. They are constantly present with us; and although the subject may be extremely uninviting, it is nevertheless of great interest and importance, and we cannot wisely remain in ignorance of the nature of parasites on account of the direct and immediate bearing of their origin and existence on practical questions in Pathology and Hygiene"—(AITKEN.)

Extremely interesting and necessary as is their study from a Pathological point of view, it will be beside the object of this paper to discuss in any but a very brief manner the Pathological bearings of Parasites; but almost, (if not quite as much) interest may be derived from viewing the Hygienic side of the subject, and there can be no doubt that it should be the aim and object of all scientists so to study the life-history and habits of the various kinds of Parasites affecting the human frame, that they may be in a better position to indicate the manner in which to effectually eradicate the scourges wrought by these pests.

I will endeavour therefore to give a short account of some of the more common Parasites known to affect inhabitants of British Guiana with the diseases liable to be produced by such Parasites, and the rules of health that should be observed by such as would wish to keep their bodies as free as possible from playing the part of host to these unwelcome but very persistent guests.

Commencing with the sub-division Entozoa of the great class Zoo-parasites or Animal Parasites, British

Guiana affords numerous typical examples. Of these it will be sufficient for my purpose to briefly describe the following:—*Ascaris lumbricoides*, *Anchylostomum duodenale*, *Trichocephalus dispar*, *Filaria medinensis*, and *Filaria sanguinis hominis*; the descriptions in most cases being taken from AITKEN'S Science and Practice of Medicine.

The *Ascaris lumbricoides*, or round worm, is the most common of human entozoa. It is much more common in children and adults than in old people. And it is very much more common in the children and adults of British Guiana (and probably other tropical countries) than in more temperate climates. Very few post-mortem examinations in British Guiana fail to reveal the presence of one or more of these extremely loathsome looking animals. In some cases they are so numerous as absolutely to obstruct the intestines. These Ascarides inhabit chiefly the small intestines, but may pass up into the gall-ducts, the stomach, the œsophagus, the nostrils, mouth or frontal sinuses. They are extremely fertile, and it has been calculated that there are sixty-four millions of ova in every mature female *Ascaris*!

“What becomes of all these ova? Being discharged by millions, many of them, in large cities, are carried into streams of water.” There they may become food for numerous inhabitants of the water. After a certain length of time under favourable conditions each ovum contains a living embryo; but the embryos may remain in this imprisoned or encysted state for many months or even years together, and it is not until the shell of the egg is broken through that the embryo can escape. After escape from the shell the embryo is capable of living

in a torpid state, floating about in the open waters, or lying in moist places, for some length of time. And 'it is highly probable that the embryos are directly transferred to the alimentary canal of man from river and pond water.' From experiments upon other animals such as rats, it has been found that the gastric juice has been sufficient to act upon the shells and liberate the contents of the ova. Thus it appears that the round-worm, unlike many other entozoa, does not need in any stage of its existence to pass through the body of an intermediary animal bearer, to complete its life-history. And this I think is one very important reason why the round-worm is so very much more common a human parasite than many other entozoa; and also why it is so very much more common in countries like British Guiana, because there are so very many more facilities and opportunities for drinking foul water, such as our trench-water. And without doubt these entozoa are met with chiefly amongst the lower classes of our population, such as would not hesitate to imbibe freely of water however foul.

The *Anchylostomum duodenale* or *Dochmius duodenale* is likewise of only too frequent occurrence amongst inhabitants of British Guiana. It is of much smaller size than the round-worm, being only about one-third of an inch in length, and on that account is much more liable to be overlooked in post-mortem examinations. The worm was first discovered by Dubini at Milan. It is extremely common in Egypt where the disease it gives rise to is called "Egyptian Chlorosis." And without doubt it is to be found in all tropical countries. And these parasites were the sole cause of the great havoc

produced amongst the workmen in the St. Gothard tunnel; and a like outbreak was noticed amongst the miners of St. Etienne. The symptoms produced by these entozoa as shown in their unconscious hosts, are "extreme pallor of the visible mucous membranes, with excessive weakness, dyspnœa, palpitation, and a tendency to syncope. Dropsical effusions supervene, and death sometimes follows from dysentery and diarrhœa; but the loss of blood consequent upon the suction wounds of the Sclerotomes is the real cause of the malady, whether the attacks prove fatal or not." Now it may be somewhat difficult to understand how it is that such very minute animals are capable of sucking such a large amount of blood from their unconscious hosts, as to produce such serious ravages. The actual amount of blood capable of being extracted by one of these parasites must indeed be extremely small; but once the wound in the mucous membrane of the intestine has been produced numerous and various causes are continually occurring to keep the flow of blood in motion, such as the peristaltic action of the intestinal walls and the passage along the alimentary tract of the intestinal fluids and any irritating particles. Then again it is only in those individuals who may be so unfortunately hospitable as to lodge hundreds and thousands of these unwelcome guests, that anything like the above train of symptoms can be produced. Cases occur over and over again in which a few of these parasites have been found post-mortem, whose hosts have presented none, or very few of the above distressing train of symptoms.

The length of the male parasite is about one third of an inch, its width about one-twentieth of its length

The female is a little longer and bigger generally. One end of the male is drawn out into seven somewhat stunted filamentous processes continuous with the alimentary tract. And it is with these sucker-like protrusions that the parasite clings to the mucous membrane of the intestine and obtains the nutriment necessary for its existence. On examining a piece of intestine which has been affected with these parasites, there will often be observed to be several minute raised spots of congestion indicating where the parasites have been imbibing, and aptly comparable to so many leech-bites.

With regard to the life-history of these entozoa, I think it is extremely probable that it is precisely identical with that of the *Ascaris lumbricoides*, that is to say, that it is not necessary for the anchylostome in any stage of its existence to pass through the body of an intermediary animal ; but that if its ova are imbibed in drinking water, their shells are capable of being dissolved by the action of the gastric juice liberating the embryos which are then able to fully develop themselves. JONATHAN HUTCHINSON, however, suggests that it may be a development of the *Dochmius trigonocephalus* of the dog.

The *Trichocephalus dispar* or *whip-worm* is common, but not nearly so common as the round-worm and anchylostome, in British Guiana. NORMAN CHEVERS in his Diseases of India says that he recollects only having met with it once in India and thought it to be imported. I have met with it very many times here in the post-mortem room, and usually the cases contained several specimens of it. The anterior two-thirds of the body is filiform, terminating in a mere point, the posterior

third being thickened and corresponding to the handle of the whip. The length varies from an inch and a half to two inches, according to sex. They are met with principally in the cæcum. I have never seen any in the small intestine. In small numbers they occasion little or no disturbance; but cases have been quoted in which "paralysis with loss of speech" resulted from the intestinal irritation occasioned by the presence of large numbers.

With regard to all these forms of entozoa the one sure road to their effectual prevention lies in the insistence of absolutely pure water for drinking purposes. To quote from CHEVERS' Diseases of India—"When we say, 'drink none but the very best water afforded by the locality, let that be filtered and boiled, and again let it be drunk only as weak tea or soup,' we recommend the whole prophylaxis of round worms"—and we may add of most entozoa.

The *Filaria medinensis* or guinea-worm is extremely commonly met with in India; but so far as I can ascertain at present, I don't think it is anything like as common in British Guiana. I have myself seen only one or two cases; but I have been told by several Medical Officers in charge of country districts that it is by no means uncommon.

It usually measures from one to three feet in length with a breadth of about one-tenth of an inch. In the adult condition it infests the feet and legs, or other exposed parts of the body. It is essentially a tropical parasite. As a rule the patient is unconscious of the presence of the worm till it is nearly mature and ready to make its exit. Occasionally it exhibits wonderful powers of

migration, sometimes passing from the shoulder to the forearm or hand, or from the thigh downwards to the foot. Its presence may be recognised by a peculiar cord-like feeling beneath the skin. It may give rise to abscesses and severe inflammatory disturbances, rarely fatal results have been recorded. They are by no means always easy of extracting whole, the worm usually breaking before extraction is completed. The usual method is to wind off the worm on a piece of stick, or the application of a steady stream of water to the affected part. When the parasite is mature and ready to leave its host, a small bleb forms, the fluid of which contains numerous young *Filaria* which have been ejected from their parent. This ejection of young guinea-worms continues for a variable period, the time for the extraction of the parent worm corresponding with the cessation of the emissions of the young.

For some time it was held that the guinea-worm found ingress to the human body through the ducts of the skin, as in those who go about bare-footed in swampy places, or bathe in water abounding with microscopic tank-worms (CARTER). But FEDSCHENKO has discovered that the "escaped embryos of the worm perforate the skin of minute crustaceans; here, after a period of only twelve hours, the embryos undergo a fresh change of skin. At the end of one month and six days they acquire their highest larval stage of growth, and then with their intermediate hosts, they are transferred to the human stomach. The males eventually perish, and the females migrate through the tissues of the body to the skin. Hence we see that in all probability the guinea-worm is conveyed to the human frame by means of

drinking water. But these worms unlike the common round-worm, require an intermediary host before they can attain to adult life in the human body, that is to say, that were the young *Filaria*, as they are ejected from their parent, taken into the human stomach straight away they would be unable to attain to any further degree of development and so cause no future discomfort to their hosts. But alas ! their intermediary hosts exist in large numbers in any *impure* water. If, however, the young *Filaria* are placed in *pure* water, they will die in a very few days, simply for want of food. The importance of insisting on a pure water supply, more especially in the tropics, cannot be over-rated.

The next entozoon which I propose to deal with is the *Filaria sanguinis hominis*. This also is very commonly met with in British Guiana, Dr. HILLIS being the first one to call attention to its existence here by recording a case of hæmato-chyluria in which he had discovered the parent worm. In any case of chyluria occurring here, where due search is made, the *Filaria* will be found to exist, and indeed it may be found in a few cases where there are apparently no signs of disease present. Its association with elephantiasis yet remains to be worked out. This parasite was first discovered by Dr. TIMOTHY R. LEWIS, of the Army Medical Service, in 1869, who found it in the urine of patients suffering from chyluria. It is of great interest and practical importance for the inhabitants of tropical and sub-tropical countries. "Ever since Dr. LEWIS discovered this parasite, evidence has been accumulating to show that this hæmatozoon is more or less intimately connected with several severe and intractable, and, unfortunately, by no means rare diseases

in those regions. It has been shown that disorders of the lymphatic system, especially in the tropics, are found frequently associated with, if not caused by, *Filaria*. Nævoid and ordinary elephantiasis arabum, chyluria, hæmaturia, lymph varix and abscess, hydrocele, affections of the cord and testis, diarrhœa, fever, cachexia, deterioration of general health, certain skin diseases, deafness, eye disease, have been ascribed to the existence of such filaria, although it is not contended that they are always so caused." Every case of chyluria which I have come across in this colony, I have ascertained to be associated with filaria in the blood; but with regard to elephantiasis, I have not been so successful. I have taken several cases at random and failed to find filaria in the blood.

The *Filaria sanguinis hominis* is an extremely minute parasite occurring in large numbers in the blood of human beings usually affected with certain peculiar diseases, and almost always in those resident in tropical climates; although a few cases have been recorded in persons who have never lived in the tropics, and in certain people who have been apparently otherwise quite healthy.

"Its average length is $\frac{1}{75}$ " ($=0.34$ mm.); its breadth $\frac{1}{3500}$ " ($=0.007$ mm.) or about equal to the diameter of a red blood corpuscle. It is enclosed in a transparent tubular sac, within which it can be seen to alternately contract and elongate itself. This sac is extremely delicate and translucent, and may sometimes, when the worm has shortened itself more than usual, be seen collapsed and folded like a ribbon, and the next moment be instantaneously straightened again, by the extension

of the *flaria* to its ordinary length. After death the worm may occupy either the entire length of the tubular sac, or be so contracted as to leave the tube empty at one or both ends The internal organs are not sufficiently differentiated to be recognised with anything like certainty, although when carefully scrutinised from time to time during the twenty-four or forty-eight hours that the parasites may continue to live, something like differentiation of an alimentary canal may be recognised." (TIMOTHY LEWIS). The importance of this parasite and its connection with certain diseases such as *Elephantiasis* and *Chyluria* cannot be over-estimated. That it occurs in all cases of *Elephantiasis* has not by any means yet been satisfactorily determined; but its connection with *Chyluria* may be considered to be fully established.

And although it is not absolutely established that these diseases depend solely upon the *Filaria* for their production, yet the intimate relation shown by these diseases and the almost invariable presence of these parasites point very strongly to the relation of cause and effect. The idea then at once occurs that if only we can prevent the ingress of these parasites into human beings, we shall at once commence to eradicate these formidable and oftentimes incurable diseases. Now the credit of this idea and the establishment of it on a definite and rational working hypothesis belong entirely to MANSON. He has proved very conclusively by numerous experiments made in China that the mosquito attacking a subject affected with the *Filaria sanguinis hominis* imbibes along with the blood of the subject numbers of these *Filaria*, which is only natural, seeing in what

large numbers, these parasites occur in a single drop of blood. In the mosquito's stomach a few of the parasites may undergo a developmental metamorphosis resulting in the formation of embryonic forms. These latter when the mosquitoes go to the water to deposit their ova, without doubt also obtain access to the water. What more probable than that they are in this condition imbibed by man with his drinking water, and so are enabled to undergo further development in the stomach of human beings. Here again there is another example of parasitic disease, the parasite on which it depends having in one stage of its existence to pass through an intermediary host—in this instance the mosquito—before it can attain to the full developmental stage at which it becomes injurious to man. And the moral of this highly interesting piece of experimental investigation results in nothing more or less than the absolute necessity of a pure water-supply. As MANSON says—"the impossibility of permanent and thorough cure of elephantiasis is apparent The prospect on the side of prevention is much more hopeful; for, if people in countries where the filaria is endemic would but cover their wells or water-jars with a netting sufficiently fine to keep out the mosquitoes, or if they filtered or boiled their drinking water, they would never get the filaria or the disease it produces, elephantiasis."

That its connection with the mosquito is more than likely gains weight by the peculiar fact, which anyone can verify for himself that it is only towards night-time that the filaria can be found in the blood of human beings, commencing about 6 p.m. and gradually increasing in number till midnight, after which a gradual

decline in numbers takes place, it being scarcely possible to find a single specimen in blood drawn during the day-time. And it is at night-time that the mosquito is best enabled to perform its work of execution on human beings. This appearance of the filaria at night-time and their disappearance during the day, is known as "Filarial Periodicity."

The above parasites form typical examples of the Entozoa common to British Guiana and other tropical countries. Of the next division of the Zoo-parasites, viz., the Ectozoa, it will be necessary for me to say but little, including as it does so many too familiar, and withal, loathsome creatures. But there is one parasite amongst them peculiar to British Guiana and most tropical countries about which, although very well-known to all residents here, it may be interesting to say a few words. I refer to the *Chigoe* (pronounced Jigger), or to give it its full classical title, *Pulex penetrans*.

It is a very minute parasitic insect usually regarded as a true flea belonging to the genus *Pulex*. "The Chigoe ordinarily lives in dry and sandy situations, where it multiplies to a prodigious extent. It attacks, however, the feet, chiefly underneath the nails and between the toes; the impregnated females burying themselves beneath the skin." But it is by no means limited to the feet for its sojourn, I have seen several cases where the hands and other parts of the body have been affected, chiefly amongst coolies working on estates. After it has burrowed beneath the skin its abdomen swells to the size of a pea or larger; and, unless removed by operation, gives rise to acute local inflammation, terminating in suppuration and sometimes in extensive ulceration,

with even fatal results to the patient. "In bad cases amputation of the toes and adjacent parts becomes necessary. Left to themselves, the larvæ escape from their host, and probably, after the manner of bots and other parasitic insects, penetrate the soil for the purpose of acquiring the pupal stage of growth." The prophylaxis of this parasite is self-evident, to keep the feet well-protected with boots and never to go about barefooted in places where they are known to exist. It is quite possible to become infested with these parasites by even walking about barefooted on the floor of some of our houses.

Another familiar example of the Ectoza in British Guiana is that very persistent and irritating creature which we call the *Bête-rouge*; but I can find no mention of it under this name in many of the works which I have consulted.

I take it to be intimately allied to the *Leptus autumnalis* or Harvest-bug. It is, as every one in British Guiana knows, of a brick-red colour, oval in shape, and about $\frac{1}{3}$ to $\frac{1}{2}$ mm. long. The symptoms it is capable of producing are too well-known to all of us. And though in some few cases it is able to produce somewhat severe types of skin-disease, in most cases it produces no more result than the excessive irritation, increased at night-time, with numerous red papules and wheals.

Then there is another affection peculiar to the country districts of British Guiana, and so frequently met with amongst the coolies working in the sugar-cane fields—which undoubtedly is of a parasitic nature, though I have never yet heard of the exact nature of the parasite, or

its actual identification, I refer to *Ground-Itch*. We never see cases of it in Georgetown ; unless such cases as may happen to come to town from the country. It affects chiefly the feet. And the appearances shown, are very much like those seen in the hands of patients afflicted with Scabies or ordinary Itch, only on a much more pronounced and extensive scale. Papules, vesicles and pustules form, many of these presenting the appearances of the typical *burrows* so familiar to Scabies. I, myself, judging from the naked-eye appearances produced, am much inclined to think that the disease is produced by an *Acarus*. And I think that District Medical Officers might soon satisfactorily establish the identity of the parasite, with a little trouble.

The second great class of Parasites—Parasites of the Vegetable Kingdom—need not detain us long. The most interesting example of the Entophyta occurring in tropical regions is that known as the Cotton-fungus (*Chionyphe carteri*) which produces the disease known as the Fungus-foot of India. But up to the present time, I have not as yet heard of its identification in British Guiana ; though it is by no means improbable that it does occasionally exist here. I believe it has never been described as existing elsewhere than in India, and there it is said to affect the natives only, no European having been known to have been afflicted with it. It produces considerable distortion of the feet, sometimes affecting the hands, with thickening of the tissues, degeneration of the bones, and numerous different sinuses opening in the centres of raised papules, discharging either minute fatty particles or black masses composed of fungoid filaments, cells, and pigmentary deposit. The

disease runs a very chronic course, and usually results in amputation of the affected members.

Of the Epiphyta, tropical countries afford us as numerous examples as any of the more temperate climes, if not more. They include the fungi which produce the various forms of 'ringworm'. Special names have been given to certain forms of the disease occurring in oriental places, such as the Burmese, Chinese, and Indian ringworm; but TILBURY FOX is of opinion that the parasite is precisely the same as that causing the ordinary ringworm of the scalp (*Tinea tonsurans*) and that these forms of the disease differ from it essentially in the fact of its occurrence on the non-hairy parts.

Of the third great class of Parasites—Parasites of extremely minute organic forms—*Bacteria*—it would be beyond the scope of this paper to enter into. Suffice it to say that it is to this class that Pathologists in the Tropics as well as in all other countries, must now turn their utmost skill and attention for the elucidation of some of the most interesting, though direful, diseases. To us in British Guiana they are of all absorbing interest when we know that on the presence of that extremely minute organic form, the *Lepra bacillus*, depends the terrible disease of Leprosy. And a yet more prevalent and very fatal disease, Phthisis, (although not nearly so prominently before the eyes of the public on account of its not producing such loathsome objects as its congener Leprosy), as every one knows now-a-days, depends for its existence on the *Bacillus tuberculosis*.

Bacteriology and Pasteurism are now the most absorbing topics of Medical Science; but it would require many pages to do the subjects anything like justice.

In the above imperfect attempt at describing certain Parasites, I have selected those which are most common to British Guiana and the Tropics. In most instances our experiences here with regard to parasitic disease correspond almost entirely with those so well-established by observers in India. But there are one or two very notable exceptions, whether absolutely true or not, I am not yet prepared to say. Any writer on the Parasitic Diseases of India remarks on the extreme frequency of the occurrence of Tape-worm (*Tænia solium* and *Tænia mediocanellata*) amongst all classes who partake of animal food. Now our experience in British Guiana is quite the contrary. I have only seen specimens of two or three tape-worms since my connection with the colony and those had been found *post-mortem* in the bodies of foreigners. Nor again do we find the various forms of Parasitic Cysts, such as the larval form of *Tænia echinococcus* or the *Trichina spiralis*, as existing in British Guiana except on very rare occasions. I have never yet heard of a case of Trichinosis as occurring in this colony; but, at the same time, I think it extremely likely that it does occur occasionally, and to a greater degree in all probability than any of us suspect; the symptoms of the disease being enveloped in some obscurity, it is very likely to be overlooked. That the Guinea-worm is not nearly so common along our coast line of British Guiana as in India, is most probably due to differences in the nature of the soil. EWART states that the prevalence of Guinea-worm is most commonly associated with the existence of trap rocks.

It is evident that the prophylaxis of Parasitic Disease may be summed up by the words—*strict cleanliness*.

Most people associate the diseases of the skin which are caused by Parasites with *dirt*, and very rightly so; but we must go further and connect the majority of the diseases caused by internal Parasites as usually produced by neglect in the proper attention to strict cleanliness with regard to our drinking-water as well as all articles of food.

The population of British Guiana generally does not as yet attach sufficient importance to the absolute necessity of a pure water supply. The alarming prevalence of the *Ascaris lumbricoides* alone shows this. Its prevalence without doubt is due to the large amount of filthy water which is drunk; and its greater prevalence amongst those classes who are in the habit more or less of drinking such water is very evident. But it is not only water which actually looks and smells filthy that is from a hygienic point of view impure. Much of our vat-water is unfit for drinking purposes until it has been well boiled or filtered. The tank-worms which are so often seen in it, are anything but evidences of its purity. Sufficient attention is not paid to the regular and systematic cleaning out of our vats. So long as we are careless about our water-supply, so long shall we have disease in our midst; and if the above few pages may serve in a small degree to direct some attention to the matter, they will not have been written in vain.

Contracts with Cane Cutters.

By A. R. Gilzean.



HIS estate (*Anna Regina*) has for many years depended on black men from the neighbouring villages for its supply of cane cutters. Formerly it was the custom for the manager to order certain fields to be cut and for the overseer in charge of the cane cutters to make a bargain with them for the cutting of each field. The price depended on the quantity of canes in the different fields, the demand for cane cutters in the district and the necessities of the estate at the time. The labourers often wasted days in wandering from one estate to another in search of higher wages before setting to work for the week. They never worked on Mondays and could not be depended on to begin work until Wednesday or Thursday. The labourers naturally took full advantage of our necessity when they saw the supply of cut canes running short, and organised strikes were of weekly occurrence. The consequence of this was that a large stock of cut canes had to be left on hand at the end of a week to keep the mill supplied for the first part of the next week. When the men began work they insisted on having enough work to last them for several days allotted to them at once. The canes which they cut first were at the bottom of the heaps placed near the trenches for removal by the punts, and were frequently the last to be loaded up for grinding. As the canes deteriorate rapidly every hour they are left after cutting before the juice is converted into sugar,

the system was a ruinous one for the estate, and it was demoralising and unprofitable for the labourers. When the price of sugar fell from about 5 cents a lb. in 1883 to $2\frac{1}{2}$ cents in 1884, the production could only be carried on at a loss under any circumstances. It was decided to try to reduce the loss by improving the system of cane cutting. Some time before a grinding was contemplated, the cane cutters were called together and the matter was put before them. They were asked to enter into contracts with the estate to cut canes for the grinding of three months. The stipulations of the contract were that a bounty of \$5 be paid to each man on signing it, that the estate should provide him with cane cutting when possible or weeding at current rates if not, that each day a day's work be taken and completed, that work should be started on Monday in each week and continued for five days, that the price of cane cutting should be 24 cents for a cord of unburnt canes 8 ft. by 4 ft. by 4 ft., or 20 cents if the canes were burnt. Hospital accommodation in case of sickness was to be provided for the labourer during the time of the contract.

At first the people would not listen to the proposal, and it is doubtful if they would ever have done so if it had not been for the advice given them by Mr. J. E. HEWICK who was at that time Sheriff of Essequibo. He took a great interest in the lower classes and he pointed out to the labourers the advantages these contracts offered to them. Additional inducements were held out to them in the shape of prizes from \$50 down to 2 shillings for those who earned the most money during the term of the contracts. Eventually 47 men

were got to sign and they fulfilled the terms of their contracts most satisfactorily. They earned more money than they had ever done before, and the Factory was kept supplied with as many fresh canes as were required. Many men who did not receive bounty nor signed contract, worked on the same terms as the contracted labourers. Little difficulty was experienced in getting 50 men to sign contracts at 20 cents a cord for unburnt and 18 cents for burnt canes in 1885. In 1886, 61 men signed contracts, and in 1887 150 at 16 and 14 cents a cord.

In 1888 it was decided to divide the men into two classes. 63 who had earned over ten shillings a week on the average during the previous crop were given \$8 bounty, and those who had earned less but had worked well were given \$4. New men were given \$4. Contracts were entered into with 173 men out of double that number who applied. This gang was found to be rather too large and the next year (1889) only 100 men were accepted. A new system of bounties was adopted that season, \$5 was paid to each man on signing the contract and he was promised \$3 more at the end of the term if he fulfilled all its conditions faithfully. For this 1890 grinding, a bounty of \$10 has been paid to 101 picked men and \$8 to 38 others.

On the whole it is found that the system of making the amount of bounty to be paid to two classes dependent on the working of individual men during the previous crop, is the most satisfactory one. The bounties are generally offered a couple of months before the grinding starts. This is a great inducement to the labourers to sign the contracts as they are glad to get the money in

the slack season. In 1887 seven men absconded but with that exception all the men who have signed contracts have either fulfilled them, returned the money or been excused. Only 3 cases before the magistrate have arisen out of these 720 contracts. The prices for cane cutting which continued to be 16 and 14 cents have advanced this year to 18 and 20 cents a cord of burnt and unburnt canes respectively. Prizes from \$50 downwards were paid to the men who earned the most money at cane cutting in the years 1884, '85 and '89 and \$100 downwards in the years 1886, '87 and '88.

BENJAMIN MCPHERSON who belongs to Ann's Grove, East Coast, Demerara, has won the first prize for the last 4 seasons. His earnings for the 43 weeks of crop season during those years has been \$216 or \$5 02 a week on the average. He works as a foreman at the Gold-Diggings when no cane cutting is going on at *Anna Regina*. His brother has won the second prize once, and his cousin three times.

The cost of cane cutting under this system of contracts including bounties, prizes and hospital benefits extended to the men, is about \$4 per ton of 1st sugar at the present prices of 18 and 20 cents a cord. Considering that no house accommodation has to be provided and that the estate is under no obligation to find work for the labourers during the 9 months a year during which no sugar is made, the price is not unreasonable for an ample supply of freshly cut canes. In dry weather each man can, on the average, cut enough canes in a week to make a little over a ton of sugar.

*Notes on Scale and other Parasitical Insects.**

By R. Ward.



THROUGH the nature of my occupation, scale insects and their ravages come, unfortunately, under my daily observation, and it may be of use and interest to those who possess a garden, if I jot down here a few rough notes on the subject. For the past two or three years some trouble has been taken at the Botanic Gardens, by enlisting the interest of scientific men at home, to get these minute predatory creatures identified. In this matter the Gardens are under obligation to several gentlemen who have made scale insects a special study, with the result—it can hardly, from the cultivator's point of view, be regarded as a matter of congratulation—of the discovery of several new species.

A fine set of microscopic slides on which specimens have kindly been mounted by S. J. MCINTIRE, Esq., (to whom we are principally indebted in this matter), has enabled me to identify, and give the scientific names of, the several species of which I shall have to speak. They are not the whole, for several are still being worked out by the scientific experts. My remarks will be chiefly confined to what are technically called *Scale Insects*; but in addition thereto, I shall add a few observations on

* Figures of the greater number of Scale Insects referred to in this paper, will be found in the last volume of *Timehri* (*Timehri*, Vol. iii. New Series, 1889, p. 313).—ED.

others already familiar to all who are acquainted with garden plants.

The injurious effects on plant life of these minute parasitical or otherwise predatory insects are very great indeed, and their modes of attack exceedingly various. There is scarcely a plant that one can certainly say is free from the ravages of one or other of the pests. Their power of reproduction too is enormous, and rapid beyond conception, and hence in many cases arises the great difficulty of effectively destroying them. Individually they are absolutely insignificant, and contemptible so far as their power of injury is concerned, but in the myriad hosts in which they often make their assaults the very strongest plants rapidly succumb to them. I will now describe the genera and species in the order in which I have taken my notes thereon.

Cerataphis lataniæ.—This though it resembles a scale insect is not one, and may easily be recognised by its somewhat oval shape, dark centre and white waxen fringe around the margin. So far as I have observed, it attacks palms only, particularly the only aquatic palm in the Gardens, *Nipa fruticans*. Young germinating plants of this species suffer very much, and could hardly be raised at all (at the Botanic Gardens,) were not these creatures frequently, by hand, washed off. In all cases as regards scale insects, it is better to take timely action in their suppression, otherwise a general washing with powerful destructive liquids will be required, which in the most careful hands often prove fatal to the life of the most delicate plants, as well as that of the insects. Careless washing is not of much use. Every precaution should be taken to get into their hiding and breeding

places, so as to touch the secret spots whither the larvæ resort.

Orthezia insignis.—This, like the foregoing, is an Aphis. The part by which it adheres, or the body of the insect, is dark in colour with quite an elongated white waxen appendage which develops with the insect. In the very early stage of development, little or no appearance of this appendage is visible; only the dark body with slight traces of a waxen fringe here and there. This pest, however, affects many plants, especially those that are herbaceous or soft of texture. When found on more woody plants it seems to live principally on the young growth—the outer parts of the shoots. Wherever found it is in colonies, each individual apparently trying to outdo his neighbour in getting at the most delicate parts. But although common it is not nearly so destructive or troublesome as many of its allies. In the young stage it is very abundant; after it becomes fully developed, it is easier preyed upon by its natural enemies, which play an important part in limiting its ravages. In this respect no insects are more assiduous than the grubs of the different species of *Coccinella*, *Syrphus*, the various *Hemerobiidæ*, of which the different species of *Chrysopa* act a chief part. If they had not these natural enemies to subdue them, the efforts of man would be unavailing, so great is their power of reproduction and the voracity with which they feed.

Ischnaspis filiformis.—A somewhat elongated small white looking scale, commonly seen on mango leaves and fruit, in patches or groups. In its attacks it seldom fails to extract all the life from the parts of the plant on which it has colonised. It does not prey upon

all trees or leaves alike, but seems more generally present on such as are suffering from other causes. The better kinds of grafted mangoes, which are hardly ever so vigorous as the common kinds, seem to suffer most from this scale. As soon as it is seen, no time should be lost in removing it. Where the fruit is attacked, decay soon sets in, but where the invasion is on a limited scale this may be prevented by carefully brushing the colonies off.

Chionaspis citri.—This coccid, not unlike the preceding one in size and colour, is the pest of the Orange family here—limes, citrons, oranges and bhal, being alike attacked by it. Sometimes the branches and stems of the trees become absolutely white by the great numbers of the insects present, to whose attack after a time the trees are certain to succumb if they be not washed off.

Ceroplastes vinsoni. A white waxen looking scale, more or less orbicular in shape, with a somewhat irregular outline of slight projections. This insect more especially attacks ferns, though many genera appear to enjoy entire immunity from it. So far as has been observed here, it does not affect more than six species, which too are limited to the genera *Adiantum* and *Polypodium*. Since it was examined, another coccid, identified as of the same genus, has been found on the native "Long John Tree" (*Triplaris surinamensis*)—This is probably quite a distinct species, of which I forbear to say more till the specimens forwarded for investigation have been definitely determined.

Vinsonia stellifera.—A very beautiful scale, looking like a minute starfish, by which form it may be very

easily recognised. In its earlier stage, it is of a rich silvery colour, but in an adult stage is much larger and assumes a darker hue. It preys on a great variety of plants, from orchids and aroids and other shade loving plants, to trees and shrubs which grow in the open. The symmetrical manner in which the scales arrange themselves on the backs of the leaves is remarkable. Its texture is brittle, and the best and perhaps most effective way of removing it is to use a small piece of wood in scraping and rubbing it off. This operation should be performed carefully to avoid injury to the leaves by the pressure of the piece of wood. In the adult stage these insects are, so to speak, so cemented to the leaves that washing or syringing in the ordinary way is of little use as an attempt to get rid of them.

Aspidiotus personatus.—Of this genus several species have been forwarded for identification, three or four of which have proved new. That here named cannot be regarded as so destructive as some of the foregoing kinds of scale. Although commonly met with, it is seldom found in great numbers. Its minuteness and tenacity of adherence to its host render it a very troublesome pest to deal with. The shape is conical and the size about that of a pin's head, the texture is hard and the colour almost black. Some of the new species of this genus are considerably larger than this. The several species affect numerous hosts, from palms and other trees to small herbaceous plants. Where present on a limited scale, washing or scraping of the leaves may be resorted to as the most effective way of getting rid of them.

Lecanium mangiferum.—This is the chief of our mango pests, and of all the genera mentioned none is so

troublesome or so abundantly represented in the Gardens as this. And as regards the several species, the same remarks are true. That mentioned is found to attack several plants, but none to so great an extent as the mango, from which it has derived its name. In form it is flat, and rather acuminate, being broader at one end than the other, and of a brownish colour. It affects the under sides of leaves, never apparently the branches. It does not adhere very tenaciously and is best removed by hand washing with soap and water.

Lecanium testudo.—A second species, irregular in outline and dark or black in colour. Compared to the last, the members comprising the colonies are few in number. It is found to attack several plants. Instead of confining its ravages to the parenchyma of the leaves, it preys on their ribs, stalks, and also on the branches. The plants on which it is found are the Akee (*Blighia sapida*), the Oronoque tree and other species of *Erythrina*, *Combretum laxum* &c. Perhaps *L. testudo* may be looked upon as the least troublesome of this genus.

Planchonia fimbriata.—Twigs and leaves of the Akee affected by scale were sent to Mr. MCINTIRE on which was found this species, accompanied by *L. testudo*. This, however, is by far the more destructive of the two, and indeed may be regarded as more destructive than any yet mentioned. Its mode of attack is similar to that of *L. testudo*, but it gives the stem or part of the stem, a warted or cankered appearance, and if left unchecked greatly arrests the growth of the plant. Its principal host here is the Akee, but it has been found as well on the Central American Rubber (*Castilloa elastica*), and also on one or two native trees. All these plants, when it is present, exhibit the same warted and cankered appearance. To remove it a small hard brush is required.

Mytilaspis buxi.—This species may be looked upon as exceeding in fecundity any yet mentioned, and on this ground is one of the most destructive. It preys on several garden plants,—namely *Monstera deliciosa*, *Anthurium magnificum* and others of the same genus, and numerous palms—all of which plants possess a thick leathery texture of leaf, which quality appears to be what is required to invite the attacks of the insects. A thin coating of vaseline applied with a brush, is a good and sure way of checking their multiplication and ravages.

Carteria lacca.—This is a large, peculiar, and, in this country, very rare scale. Only once has it been discovered in Guiana, and that was at the Gardens on young plants of Coca (*Erythroxylon coca*). Mr. DOUGLAS, to whom the specimens were forwarded by Mr. MCINTIRE, recognised it as the same species as that which produces the gum lac of India. These specimens were the first, and last, though a very careful search has been made since they were discovered.

I have mentioned only scales that are common. A plant may have many parasites, and a parasite many host-plants. This I have shown in regard to several, but others which are rare or confined in limited numbers to single plants I have not described.

I may now go on to other minute predatory insects which do not belong to the scale family. Perhaps foremost of these is Red Spider (*Acarus telarius*). This pest is well known to gardeners at home to be one of the most destructive enemies to be dealt with in plant houses. It has been detected on several plants under cultivation here, both in and out-doors. Grape vines especially suffer much from it. This insect is a minute red creature,

moving about very rapidly, but so small as hardly to be detected by the casual observer. Leaves attacked by it assume a light pale or sickly colour. Once it gains a footing, the utmost vigilance and care are required to get rid of it. Several methods are resorted to for keeping it down, such as frequent syringing with pure water, or a solution of flour of sulphur and water forcibly applied to the under sides of the leaves, where it is chiefly found. The latter mixture, when the water has evaporated, leaves a fine coating of sulphur on the affected surface in which the creature cannot live. A syringing with soap water, repeated for several days, is also an effective remedy. In this case the plants should subsequently receive a syringing with clear water. These remedies should not be applied during the day while the sun is bright.

Thrip.—*Thrips vulgatissima*, is a minute elongated black insect, the ravages of which are somewhat of a character with those of the preceding. Like Red Spider, it can move rapidly about, and is very destructive in its attacks. It loves a dry rather than a wet atmosphere. This may account for the general complaint that plants used in drawing rooms soon become unsightly, particularly crotons. One half of the unhealthy house plants met with are affected by this insect.

Mealy Bug.—Of this there are several species affecting various plants, of which may be mentioned, as the most important, the Sugar Cane, under the clasping bases of the leaves of which they secrete themselves in great numbers. Many other plants, too numerous to mention here, receive considerable damage from these pests. They are not, however, so difficult to destroy as the scale insects. By a strong syringing most of them will be dislodged, when a great

many of them perish ; by this means they are easily checked.

Green-fly.—This, like the preceding one, in fact like all this class of insects,—namely Plant-lice, Green-fly, Aphides &c.—prefers to feed on the soft tender parts of plants, rather than on the harder or more woody parts. Hence it is invariably found to live on herbaceous plants and the young growth of the more woody plants.

The fumes of tobacco smoke, as well as water highly impregnated with this powerful narcotic, is a most effectual remedy for this insect. The latter should be well mixed, and syringed on the foliage. Soap water might be employed in the same way. If proper attention were paid to syringing plants, the ravages of this insect, as well as of others, would be very trifling ; but, unfortunately, no branch of culture is less attended to than this.

Caterpillars.—Great damage is often done by caterpillars to our most valued plants ; maiden-hair ferns suffer particularly from their rapacious attacks, but I mention them here particularly on account of the trouble they have lately given in raising seedling canes. The minute caterpillar of some minute moth, almost at soon as the cane-seeds have germinated, preys upon the seedlings, and it is only with the keenest sight, by careful watching, and continual picking and destroying of the depredators, that one is able to save the better sorts.

Crickets and Locusts are also destructive to many kinds of plants and flowers. The flowers of Orchids and *Eucharis* lily are often destroyed by them as soon as they appear. They are also troublesome to the larger and most forward of the cane seedlings.

After this predatory crowd I may mention *Ants* which are said to eat, and help to keep down, Aphides and other

parasitical insects. At any rate wherever one is found to any extent, the other is sure to be present to an equal degree. It is well-known that, for value received, they act as nurses to some kinds of scales. Many means are recommended for their destruction, among which I may mention the drastic resource of pouring hot water over their nests. A bit of cord besmeared with tar and tied round the tree acts as a check to their ascent. Another remedy is to spread common tar oil on their paths; and camphor dissolved in alcohol and diluted with water, sprinkled in their haunts, is also efficacious.

Last but not least, although they cannot strictly be included under our heading, may be mentioned *Frugivorous Bats*, which destroy much of our mango and other good fruits. One remedy to apply is to hang among the fruit the prickly petioles of some of the *pimpler palms*—the long thorns of which, penetrating the wings of the bats, are an effectual protection to the fruit.

In conclusion let me say that in the remedies I have suggested I have been thinking chiefly of what, in trade phraseology is called "Nursery Stock," that is plants of small or comparatively small size and house plants, with which in my daily work I am mostly concerned, and to which the remedy of hand washing, rubbing or brushing, is easily applied. For larger plants, growing in the open ground, remedies more wholesale and quickly applied are required. In these we are carrying out experiments at the Botanic Gardens, the nature and results of which, with the Editor's kind permission I will give in a future number, describing also the less common predatory insects not mentioned here, and those which have not yet been scientifically determined.

On the Upper Berbice River.

By the Editor.



IN reporting upon my late journey along the Berbice, I have no intention of wearying out the patience of my readers by dwelling on the features of the lower reaches of the river, which, as in the case of the Demerara, are well-known. Of this district there have been several more or less detailed accounts already published, the most comprehensive of which, perhaps, is "The River Berbice and its Tributaries" by Mr. ALEXANDER WINTER, contributed as a paper to *Timehri*, December 1883. The most recent account of the river is that given in 1885, by Mr. GLAISHER, my predecessor at the Museum, "A journey on the Berbice River and Wieroonie Creek;" but owing to the desertion of the boatmen, the expedition had to be abandoned at the first rapids. Concerning the district of the Upper Berbice, above the first rapids, we have no information but that contained in the report by SCHOMBURGK in 1837, and in a short and rather meagre account by C. BARRINGTON BROWN in 1873.

Leaving the town of New Amsterdam, which is situated immediately within the mouth of the river, the contract steamer traverses about 120 miles to Coomacka, passing over the greater portion in which the influence of the tides is felt. Both banks, above New Amsterdam, were formerly lined by flourishing estates, from which coffee and sugar were the chief produce; but now the greater portion has been abandoned, especially on the

West bank ; and the traveller who cares to moralise over the fluctuations of human affairs will find here, perhaps of all places in the colony, the fittest food for his reflections.

Along the broad and estuarine lower part of the river, the banks are low and swampy, and are lined by a variable shrubby growth, among which the characteristic mucco-mucco of the swamps (*Montrichardia arborescens*), the courida (*Avicennia nitida*), and the curious "bundoorie pimpler" (*Drepanocarpus lunatus*) are conspicuous ; but further up, some distance above the limit of the working estates, the river narrows considerably and suddenly, and the banks become raised a few feet and are lined by the common alluvial forest growth.

It is in this lower tidal portion of the river, that one of the most interesting problems of the Natural History of the World, and certainly the most peculiar feature of life in Guiana, is to be met with. This is the curious reptilian bird, the hoatzin (*Opisthocomus cristatus*), locally called anna, hanna, and stinking or Canje pheasant. Here, and in corresponding parts of the Canje creek, which opens into the river below the town, and of the Abary creek, which communicates with the Berbice by an etaboo, these curious birds may be seen at all times of the year—jumping about and feeding on the fruit and foliage of the mucco-mucco, courida and bundoorie pimpler, in the morning and evening ; and resting in groups among the denser foliage, sitting on the posterior margin of their *carina sterni*, during the heat of the day. Here, on the spreading bundoorie pimpler, the various stages of their life history may be studied—from the eggs, lying two or three together on the loosely placed twigs of their conspicuously built nest, through the

young chicks, climbing about among the branches by means of bill, feet and clawed wings, to the adult birds, which in appearance are not unlike the common type of pheasant, or, in terms of a colonial bird, a golden-tinted brown maroodie.

As to the distribution of the birds along the river, they certainly are confined to this lower portion—not a single specimen being met with along the higher reaches.

Upwards to Coomacka, the features presented by the country are somewhat more interesting owing to the higher and more wooded banks, dotted at intervals with the residences of settlers of various qualities, or made conspicuous by the opening savannahs, as at Bartica, or by some historic centre, such as at Fort Nassau, the site of the old Dutch capital of the County.

A very marked feature of the river is the inconspicuous nature of the settlers' residences. With but few exceptions, these are hidden away by, or built among, the vegetation lining the river, there being but few of those large and open clearings by the river side, which give so marked a character to the scenery of the Demerara, and present so inviting an aspect to these retreats of semi-civilised life. On this account the river is rendered correspondingly more monotonous in character; and it seems to me by no means a fanciful idea, that the marked unhealthiness of the region is in part attributable to this lack of sanitary precaution.

To one unaccustomed to such scenes, the windings of the river constantly reveal pictures of great beauty—long stretches of smooth lake-like water, shut in and banked by raised forest-clad ridges, crowned by the delicate foliage of the manicole palms (*Euterpe edulis*) or

the grander growth of the cokerite (*Maximiliana regia*), with their most intensely vivid reflections in the dark water. But to one familiar with such scenes, so closely similar or comparable in the different rivers of the colony, they are marked by a monotony which hardly a rare luxuriance of flowering plants by the riverside can relieve. Not unfrequently one meets with dense flowering clusters of the golden allamanda or some other scandent plants; at close intervals are seen the peculiar plume like flowers of the wild cacao (*Pachira aquatica*), with their large ovoid pods; while the flaming inflorescences of the supple jack or coupa (*Norantea guianensis*), or the chandelier-like clusters of *Marcgravia*, occasionally rivet one's attention.

In the neighbourhood of Coomacka, the main upper tributaries of the Berbice are met with; these are the Wieroonie below, and the Wickie and Etoonie above, the first and last of which drain a large extent of the alluvial sandy savannah country on the West bank, while the Wickie has its watershed between the Canje and the Berbice in a forest-clad plateau. With these exceptions the creeks met with are small and unimportant, and but for the Kibiribirie creek some twenty-five miles above Coomacka, to which the Dutch used to resort for the benefit of its cold waters, and the Youacourie creek some fifty miles further, along which is situated the path commonly used to reach the Demerara river, they are scarcely worthy of mention.

The greater part of the first day's journey (Monday, September 15th) was spent along the Wickie creek in a vain attempt to procure Indian hands. The chief settlement is the Arrawak Mission station of Calcuni, where

about a dozen houses are grouped together on a bare sandy area; but here we encountered only old men, women and children—the young men being absent. To console us, it was said that higher up the river it was easy to get men who knew the upper reaches, but this we found later on to be but a delusion.

At Tipooroo, a little below the Kibiribirie creek, at the residence of a settler named MANDHAR, we obtained a large supply of delightfully sweet oranges, several trees of which surrounded the house, and evidently were in a most flourishing condition. Here it was somewhat of a surprise to find that native grown rice formed an important article of diet; and several large sheaves of the grain were brought from the field while we waited for breakfast.

Upwards, above this point, past the small settlement of the French resident, Polité—past Wackra-mucro, a small settlement of Indians on a low hill on the East bank, and beyond Ahwiemah, another Indian settlement some miles higher on the opposite side, the banks of the river are but very slightly raised, and extensive swamps intervene between the more elevated positions. On the higher land, tracts are constantly met with to old grants for timber or balata, and the abandoned benabs often gave welcome shelter.

Ahwiemah consists of about a dozen houses, some of very large size, splendidly situated on a hill at a bend of the river, and commanding very fine views on each side. The settlement is studded with a luxuriant growth of plantain, banana, lime, papaw and pepper trees; but the want of a sufficiently wide and open clearing detracts from its advantages. The Indians were nearly all absent,

and of the few that remained several were thoroughly prostrated with fever. Indeed at all the settlements met with, the same tale of sickness was heard.

Above Ahwiemah, and upwards until the sandy ridges in the neighbourhood of Youacourie creek are met with, the district is almost a continuous swamp, in which the prickly awarra palms (*Astrocaryum*) luxuriate and in some places completely line the riverside. The river winds about in all directions, and at the bends opens out into wide expanses, narrowing again where dense masses of grass and mucco-mucco grow out into the channel. Here and there, these projecting masses become separated and form small islands. To judge from the height of the water and the nature of the country, a considerable portion of this district must be swampy even during the extreme dry season.

Where the sand ridges abut on the river, the White hill, the highest point, rises extremely steeply to a height of about 100 ft., offering, owing to the loose sand, a by no means easy climb to the top, from which, however, the view over the top of the forest is very fine and quite worth the trouble of the climb. The East bank being quite low, an extensive spread of forest-covered country, from North to South, away as far as the eye can reach, can be observed, and far in the distance, a few low hills break the even line of the horizon. Just at the foot of the hill, the river bends away towards the East, forming a lake-like expanse. The base of the hill is riddled with the nest-holes of various species of kingfisher, chiefly *Ceryle torquata*, which seem to congregate here in large numbers during the breeding season. On the top, the hill is covered with low bush, behind which it slopes away

into an extensive grass-covered savannah, limited in the distance by a forest-clad ridge.

Above this point, the river passes through another swampy district and takes on a special character owing to numerous lake-like openings and wide etaboos, of which some are as wide as the river, though they become choked up and impassable further in. The main channel is thus difficult to distinguish except by the strength of the current. A few miles below Mappa lake, another ridge with a very steep escarpment on the river, composed chiefly of dark red and white sand, and known as the Red Hill, is passed, but this might easily be missed if one of the wide etaboos just referred to be followed.

On Mappa lake, some fifteen miles above the Youacourie creek, is situated the chief Ackawoi settlement on the river, but it is seldom, it appears, that the great bulk of the residents are to be found at the settlement. The lake is a wide expanse at the mouth of a creek on the East bank, and communicates with the river by a wide channel, from which, however, none of the benabs can be seen. The chief men of the settlement were further up the river, with the head man SIMON, known as Captain SIMON, engaged in hauling out timber for transportation by one of the wood-cutters' punts which was soon to start down, and it was only after a long palaver with SIMON that I was able to procure two hands for a week.

Just above the opening to Mappa lake, the river bends away suddenly to the left, flowing in from the East, though an open channel continues on in a straight line and seems to be the direct continuation of the main stream. As below, the greater extent of the land by the riverside was continuous swamp, crowded with the

awarra palms, though high land covered with immense forest trees lay at the back, and in many places abutted on the banks. The channel at intervals opened out into wide lake-like areas, chiefly at the bends or "points," and again narrowed in places to from 10-20 yards. A few miles above Mappa the high land predominated, and the trap rocks (*greenstone*) began to outcrop along the banks, though the height of the water effectually obscured the extent of the formation. Along these portions, the fallen trees in the water became very numerous, though not sufficiently so as to block the channel.

On the morning of Saturday, the 20th, we passed some Indian houses on the East bank where the Indian wood-cutters were engaged with SIMON, and soon after came in sight of Mr. KINGSTON'S residence at the grant at Cooroodoonie—the last inhabited place on the river. A day's journey above this brought us to Idure Wadde creek, which opens on the East bank, and on which, not far from the mouth, a lovely cascade is found, where the water tumbles in a long cataraët over the trap rocks for a total difference of height of about 20 ft. The roaring of the water can be easily heard from the river some little distance down, and the cascade is most easily reached by striking through the forest where the sound is loudest. Soon after passing Idure Wadde, on the 23rd, the first rapids of Marlissa—pronounced Marlisha by the Indians—were met with, and after paddling and pulling through eight of these, formed by dykes of granite and quartz-porphry, where in the majority of cases the channel was extremely shallow, much obstructed with stones, and the last one extremely narrow and leading from a circular lake, we

rounded a sharp curve from the East into a large lake-like expanse, at the head of which the cataract of Itabru thundered over the rocks.

Up to this point, the collections made were, with one or two exceptions, of no special interest, the forms of life under observation being similar to those commonly met with. At Coomacka in the early morning, the oft-repeated cry of the beautiful Hootoo (*Momota brasiliensis*) had been heard close by, in the belt of forest on the high land adjoining the savannah, but no attempt had been made to get specimens, under the idea that the birds would be met with more advantageously further up; but, as it happened, we had no further chance of procuring them later on. Mingled with these cries of the hootoo, there had been the loud clanging whistle of the maam (*Tinamus subcristatus*) and the curious cry of the hanaqua (*Ortalia motmot*), with the cooing of the wood doves and pigeons, which were plentiful in the bush around. Higher on the river, the distinctive notes of the bell-bird (*Chasmorhynchus niveus*) sounded from the surrounding forest, while common species of bill-birds, macaws, parrots, barbets, cuckoos, shrikes, hawks and vultures, etc., were met with at various times, but generally quite out of range. The kingfishers were by far the commonest birds, and of these a good collection was made.

Of mammals, we had been able to procure nothing. At one or two points, a howling-monkey (*Mycetes*) and a common ring-tail (*Cebus*) had been detected far out of range on some tree tops, while a few otters (*Pteronura sandbachii*) occasionally rose at a distance. Of reptiles, snakes and alligators were conspicuous by

their absence, and but a few lizards had been observed—notably, the common iguana (*Iguana tuberculata*).

Insects were considerably more numerous than other forms. The bright blue *Morpho menelaus*, and the blue-barred *Morpho achilles* were often seen flitting across the river or among the trees by the banks, together with the beautiful *Urania leilus* and the *Papilio protosilaus* and *P. thoas*, while the yellow butterflies (*Callidryas* and other forms) and the beautiful Heliconids were fairly common. Of Myriapods, a friendly centipede (*Scolopendra*) had been caught while making his way under my shirt for shelter, and a few beetles had also been obtained at the various camping grounds.

Though doubtless many interesting specimens were obtainable in these lower parts, no systematic attempts were made to procure them, the object of the trip being chiefly to explore and collect above the falls higher up. The health of the party too had suffered somewhat while passing through the lower swamps, and three of us had already been prostrated with severe malarial fever, though only of short duration.

At Itabru there was a marked change in the character of the surrounding country. The banks became high, and rose upwards gradually into low hills, more especially on the left bank where for several miles a sandstone formation extends, evidently contemporaneous with that on the Potaro at the Kaieteur falls. It attains its highest point at Parish Peak, about 1,000 feet above the sea-level, some few miles above the cataract.

The Itabru cataract, a representation of which is given in SCHOMBURGK'S "Views in the Interior of Guiana," is formed by a wide dyke of quartz-porphry which crosses

the river at a point where it makes an S-like double curve, the flow in the lake below being from N to S—exactly opposite the general trend of the river. The cataract is about 50 yards in length, 15 yards in width, and with a fall of about 15 feet, the centre of the channel, at the foot, being blocked by a large rock rising high above the water, especially when the river is low, and it is this rock which renders the passage so difficult. The northern sides of the bay are lined by huge masses of broken rock, which continue along the western side; but on the eastern end there is an open bay of fine quartz sand, from which a rather steep portage path leads through the forest to the upper part of the cataract. It will be found considerably easier and quicker, however, to portage goods across the rocks on the western side, and to take the boat by water, pulling it over the rocks on the same side wherever the rush of water in the trough-like parts is seen to be excessively great. Here one of the chief difficulties to contend with is the fearful force with which the water discharges itself through the narrow channel, which is but a gorge between the hills, and in which the spaces between the rocks become huge troughs, from which a boat with difficulty recovers itself: this indeed is a condition that obtains in all the larger cataracts on the river.

The most perfect view of Itabru is that obtained from the rocks at the south-western end of the basin, where across the smooth expanse of the lake, dotted on the right with a few tree-clad islands, the channel of foaming rushing water appears broken by the huge boulder at the base and continued on the lake as a gradually diminishing series of waves; while

the sides of the narrow gorge slope upwards into forest-clad hills—on the left, fronted by an irregular pile of huge black and red rocks, and on the right, by the open sandy bay—the opening of the gorge revealing an amphitheatre of hills behind, against the bright tint of which a tree-clad island at the head of the cataract appears distinctly outlined. Seen in the early morning, when the further hills are bathed with light, ere the island and the foaming water are touched with the sheen, the beauty of the view is at its best.

It was close to this point of view, at the entrance to the lake, that we pitched our camp, in the most advantageous position to be found. Here just within the forest shelter, but quite exposed in the front to the breezes blowing across the lake, there was a large, old, but tolerably water-proof benab, at some little distance up the steeply sloping sandy bank; and here we were able not only to sling hammocks safely, but also to store the provisions, etc. while collecting over the district, the rocks close by affording most convenient means for drying skins.

The day after reaching Itabru, we ascended the river in a corial with two of the hands as far as Winter's cataract, to get an idea of the difficulty to be met with in going to the Christmas cataracts, both BARRINGTON BROWN and SCHOMBURGK having referred to the numerous obstructions in the course. We found the channel crossed by numerous rapids and cataracts, following each other in quick succession, but none of any very serious proportions; and there was plenty of water, the sandbanks being not even visible. As regards life along the waterside, it was in this upper district, which,

from year's end to year's end, is scarcely ever disturbed by man (the Indians never penetrating so far), as it had been lower down—almost barren. But a single maroodie (*Penelope cristata*) was seen; though in a deep bay we had perceived the characteristically strong musky smell of a caiman or some other large alligator.

The next day (25th) the bateau started for Coomacka in order to bring up the stores which had been left behind; and Capt. ARNOT and Surgeon FALLON, who had accompanied me so far, were unfortunately obliged to return to town owing to expiration of leave. Meantime I was left at the camp with the taxidermist and one of the hands, one of four black men whom I had taken with me from Mahaicony, and whose worth, as they had previously travelled with me up the Mahaicony creek and along the Upper Demerara river, was well known to, and appreciated by, me. By means of the small corial which alone I had been able to secure at Coomacka, we were able to get about for collecting, and the various lines cut by the gold prospectors who were then examining the river, enabled us to range the country in many directions without risk of losing ourselves.

Of these gold-hunting expeditions, there were at the time several different parties at work, a determined attempt being made to explore the mineral resources of this part of the colony. Several of these prospected the entire neighbourhood of Itabru and the districts immediately below, where the granite and trap rocks are found, while others carried their investigations, later on, even to beyond the Christmas cataraëts; but though several likely-looking spots were met with, there were but traces of gold—"eyes" or "colour" as it is termed—

and in not a single case was anything sufficient met with to justify working for the metal. Time alone will show whether these prospections were altogether complete and satisfactory. Several of the expeditions met with more or less serious damage to their boats, owing to careless handling in the cataracts where the water thunders through the narrow gorges—two being damaged at Itabru, one at Winter's, and another at Umbrella cataract; but happily there was no loss of life in any case.

The captain of one of these boats, a strong-looking Arrawak Indian, was a celebrated man in his way—for had he not been dragged out of his hammock one night by a jaguar or so-called tiger (*Felis onca*), and yet had escaped with his life? The adventure had taken place a year or two previously, on the hill at the North-eastern corner of Itabru. In a mixed crew, the Arrawak had been the only Indian; and, as is their fashion, he had slung his hammock some little distance away from the others, in the forest. During the night the camp was roused by fearful shrieks from the Indian, and his comrades managed, by shouting and beating the ground and bush, to rescue him from a jaguar that had seized him. The brute evidently had been lurking around, attracted by the unusual event of an encampment in his region, and, coming in contact with the Indian's hammock, had seized him and attempted to bear him off. The tale was related by the manager who had employed the Indian on the occasion referred to, and was substantiated by the man himself, and must therefore be regarded as genuine—unique though it certainly is.

During the fortnight's camping at Itabru, a large and interesting collection of Natural History specimens was

made, though during the earlier part of the time I had been placed *hors-de-combat* by an intensely painful boil on the hand, and during the last five days' stay, I was utterly prostrated by a severe attack of fever, accompanied by peculiarly violent retching.

Mammals were not abundant. Jaguars were said to be common in the vicinity, and the tracks of the bush-cow or maipurie (*Tapirus americanus*), the bush or red deer (*Coassus rufus*), the labba (*Cælogenys paca*) and the great water-hare or capybara (*Hydrochærus capybara*) were at times seen by the waterside ; but none of these animals were met with. Specimens were procured of the large quata or spider monkey (*Ateles paniscus*), of the squirrel (*Sciurus æstuans*), and of the aguti and adourie (*Dasyprocta aguti* and *D. acuchi*). Blood-sucking bats seemed to be common along the river, and, at several of the camping-places, one or two of the men suffered from their visits. Otters (*Pteronura sandbachii*) occasionally gambolled about the lake, but were extremely wary, though their feeding places were frequently detected.

Birds were considerably more numerous, especially the large game birds such as the powis (*Crax alector*), the maroodie (*Penelope cristata*), the large maam (*Tinamus sub-cristatus*), the small maam (*Crypturus variegatus*) etc., several of which were obtained, and whose flesh afforded a welcome relief from the tinned meats. Two large ducks were shot closely resembling the muscovy, but with a white speckled breast and abdomen. The great green-winged, blue and red macaw (*Ara chloroptera*) was the common form seen, and three specimens were shot, though from their high flight, they seldom gave

a chance. We were also fortunate in securing a splendid specimen of the harpy eagle (*Thrasætus harpyia*) which had been shot while resting on the top of a high mora, on the hill above the cataract. In the forest, species of *Trogon*, *Ara*, *Chrysotis*, *Conurus*, *Caica*, *Rhamphastos*, *Campephilus*, *Dryocopus*, *Chloronerpes*, *Celeus*, *Dendroornis*, etc., were fairly common, and their cries often heard.

The reptiles were represented only by lizards. True, one night, one of the Indians had rushed into the benab, exclaiming "caiman, caiman!"; but the object seen turned out to be but a dark rock which had been but dimly perceived. In one of the small creeks, among the hills, one of the gold labourers had shot a medium-sized alligator (*A. palpebrosus*) which was kindly brought for me, but was so damaged as to be unfit for skinning. The species belonged to the old genus *Caiman*, with narrow elongate head, destitute of a frontal ridge, and quite distinct from the common "caiman" of the colony which is but the largest species of the genus alligator (*A. niger*). The reptile was extremely emaciated, and had evidently found a difficulty in making a living. It was placed in a conspicuous position with the idea of attracting the large wattle-faced king vultures (*Gypagus papa*), but though one or two were noticed circling high overhead none descended to the bait.

Batrachians and fish of a few forms were extremely abundant. Myriads of minute common toads (*Bufo* *agua*) hopped about among the stones and sand, and various species of *Hyla* woke the echoes of the forest at night. In the lake, at the foot of Itabru, perai (*Serrasalmo niger*) of large size were predominant,

almost to the exclusion of other fishes, and were most easily caught, any sort of bait proving acceptable to their voracity. Daree (*Leporinus*) were also procurable ; but though said to be plentiful, the gigantic low-low (*Piratinga reticulata*), and the striped tiger-fish or colite (*Platystoma tigrinum*) were never caught, although lines were regularly set for them.

Along the margin of the lakes, on the sand or among the rocks, hundreds of elongated dark shells (*Melania atra*) were to be seen, while among the trees, a rare variegated *Bulimus*, rather short and broad, was to be found. Here too, a small crab (*Gecarcinus*) occurred, and one was bold enough to seize the bait on a fish line and to cling to it until caught by the hand.

The district yielded a rich variety of insects, and many were secured—among them being two fine specimens of the large Buprestid or sun-beetle (*Euchroma gigantea*). The wild guava (*Psidium*) among the rocks were crowded with several greenish *Hemiptera* which were almost undistinguishable from the leaves, while a tiny *Curculio* was equally common on the stems of the same plants, and were highly mimetic owing to the similarity of their colouring to the bark. The most curious instances of protective colouring were met with among some specimens of *Diaffor foliacea*, which dwelt among the bushes by the sandy bay, where they were found only on the flowers of one kind of plant, on which it was hardly possible to distinguish them, though they were easily seen when they rose on the wing.

The woods around echoed and re-echoed with the shrill screeching of the Cicadas, which at times became almost deafening, but except an occasional specimen which

now and then flitted high up among the branches, they were invisible and could not be caught. Large cow-flies, the stab of which might be compared to the prodding with a large needle, occasionally worried us, and gave a variety to the misery caused by the "cabowroo" flies, which along some of the upper parts of this river are extremely numerous, especially in bare rocky or sandy places. These flies, but little smaller than the common house-fly of the colony, abstract a considerable amount of blood, and, owing to the size of the puncture, leave a large clot to mark the site of their feast. Owing to the shortness of the stabbing organs, they cannot penetrate ordinary clothes, but exposed parts are most cruelly attacked, and the bare bodies of the Indians suffer accordingly. The abundance of the cabowroo formed one of the reasons—and a highly intelligible one—given me by an Indian, why his fellows do not make settlements along these beautiful and inviting districts.

The cushie or umbrella ants proved a perfect nuisance in the camp, and the rice and biscuits formed a constant point of attack, and at times their marching columns seemed like white lines from the large pieces of biscuits being carried off by them. The most tantalising pests, however, were the bush-ticks, large and small, which were more numerous here than I had ever experienced on any other river; while higher up at the Christmas cataracts they must have been in myriads, since even on the rocks they were plentiful.

All along the district to Itabru, the trees consisted of valuable kinds, such as mora, greenheart, bullet-wood, crab-wood, purple-heart, wallaba, etc.; while hyawa, marciballi, baramalli, kakeralli and other common trees

were everywhere visible. In the neighbourhood of Itabru, scarcely a palm was to be seen along the water-side, except here and there a tooroo or loo, though in the forest the cokeritiballi was very plentiful. Orchids, common species of *Epidendron*, *Brassia*, *Brassavola*, etc., were fairly common, while most lovely clumps of *Diacrum bicornutum* grew on the high branches of many of the dead trees.

On the 9th of October, feeling somewhat recovered from the fever, I determined to start for the Christmas cataracts—the boat meantime having returned from Coomacka (on the 3rd)—and by careful handling, partly by water and partly over the rocks, we easily took the bateau over Itabru. Just above, the river curves round sharply, and, at the cataract of the Little Itabru, is discharged through a narrow channel a few yards in width, where the rush of the water is terrible. Above this follow deep curves and windings of the river, and three rapids and a cataract in quick succession, and then the Umbrella cataract is met with, where the river again narrows to a small gorge, the channel being divided by a large rock in the centre, on which a tree with branches curving downwards has fastened itself much in the shape of an open umbrella. It was at this cataract that one of the gold diggers' boats got away from the hands, who, stationed on the small island in the centre, instead of on the bank, were able neither to clear the loaded boat past the rush of water above, nor to hold her against the force of the stream. The boat drifted, curiously enough, quite safely through the cataract below, and upset in the next rapid—everything being lost; while the men, chiefly new hands, were so

paralyzed with terror that they passed the night, without food or rest, on the island.

Just above, in the middle of the curve on the left bank, the Eureka creek, one of the few to be found on the Upper Berbice, joins the river. Here, it was at first believed that gold would be found in sufficient quantity to pay for working, but further investigation gave no encouragement. Here also, I was assured by a huntsman belonging to one of the prospecting parties, that he had met with a strange white animal—pure white, he insisted—about the size of a small dog; and that by the waterside at night, the mewling of a cat—an unmistakable cat—was to be heard: but during our short stay, the strange animal was unseen, and the cat unheard.

Upwards the same high forest continued, the almost uniform green being at times broken by the red pods and flowers of the wallaba. A few tooroo and loo palms, and a few dwarf manicoles were at times seen; great vanilla vines draped many of the trees; flowering epiden-drons and brassavolas clothed many of the branches; and overhead rose masses of *Schomburgkia* and *Diacrum* on the high tree-tops. The yarooroo with its great buttresses formed a conspicuous feature. On the low-lying parts within the forest, the broad and spreading cokeritiballi and the dahlibanna grew in masses. Selaginellas grew in abundance on the moist parts of the banks, with delicate filmy ferns; and here and there small clumps of the bracken flourished in the more open sunny places.

A few short bends above the Eureka creek, a great dyke of quartz-porphry runs across the river to form Winter's cataract, the great rush of which is avoided by a channel on the right or East bank, through which the

bateau is easily pulled. After this the river widens out with a slower current, and rocks and islands begin to appear at intervals. Two of these large rocks, one covered with trailing plants resembling a head of hair, go by the names of Mr. and Mrs. WINTER, but why, no one seems to know.

Higher up, the banks begin to assume a very peculiar appearance, due to the abundant growth chiefly of two creepers, which form almost continuous sheets, like drooping curtains, along the riverside, often stretching out in broad and thin layers from the projecting ends of the branches over the river. Against this almost continuous curtain of green, the few flowering plants stood out with marked effect, more especially bunches of the "bottlebrush" and *Petræa*.

The depth of the river varies considerably between the rapids, and numerous boulders of quartz-porphry block the channel. The rapids follow each other in quick succession, but until the Savannah rapids are reached, some few miles above the Winter's cataract, they are of little difficulty. Here the bed of the river is very inclined for about from 400—600 yards, the water rushing over the broad and rocky slope with great force. The river becomes very shallow with scarcely sufficient depth to float the bateau, and rocks project in all directions, many of them loose on the slope and very slippery, and giving a very insecure footing for the boatmen, who have to pull and push the boat with great difficulty between them. The mossy water-plants (*Lacis*, etc.), are here very abundant on the rocks, and seem to consist chiefly of three species, one especially being of large size and with the stalk of the inflorescence

about the length and thickness of an immense asparagus. No pacu (*Myletes*) are to be found on the Berbice; so that these plants flourish undisturbed except by the fall of the water during a very dry season, when the rocks are found to be covered with their dried remains.

The banks on both sides, all along these upper reaches, are generally very high, and on the western sides the slopes pass gradually upwards to the Itabru mountain which lines the way to the Christmas cataracts, and runs inland as a ridge of hills. Some few miles above the Savannah rapids, a sudden curve of the river brings into view one of the high peaks, with a sharp escarpment and mural precipices facing nearly S.E., and at a distance only of about three miles from the water side. The view is soon lost, however, though it appears again higher up, where a long reach of the river in the same direction faces the escarpment. Close to this point we camped late on Saturday evening (11th).

Just above this tract of the river, not far below the foot of a long and sloping rapid with very shallow water, we were fortunate in catching two large haimura (*Macrodon trahira*), one being of very unusual size and having a large protuberance on the top of the snout—perhaps due to injury or age. These gave two splendid skins, and several very delicious meals—a consideration by no means to be scorned. Iguanas had been common all along the river, so much so that even the crew got tired of eating them. Often as many as six or seven were in sight at one time, though several made haste to throw themselves headlong into the river in their fright, sometimes from a height of about thirty

or forty feet, and giving rise to a sharp and characteristic splashing sound.

Here too, the bell-birds seemed to be common, though we were unable to procure them owing to the height of the trees among which they were ensconced. The quow or calf-birds (*Gymnocephalus calvus*) were heard far off in the forest, their bellowings mingled with the hoarse caws of the bultata hawks (*Ibycter americanus*), the yelping and quarrelling of parrots, bill-birds and macaws, and the deep roaring of the howling monkeys (*Myctetes*). The green bunyas (*Ostinops viridis*) were seen for the only time on the trip, but they were high up out of range on gigantic moras; among which also a few common sapajous (*Cebus apella*) were noticed, and the wailing cry of the quata heard. Lower down a fine specimen of the beautiful fall bird (*Paroaria gularis*) had been secured, and this was the only one met with. An occasional honora or grey crane (*Ardea cocoi*) rose at times in front and kept well out of range, while the bush or bronze ibis (*Harpiprion cayennensis*) were constantly met with.

The Sunday spent at this camp was remarkable for the downpour of rain that began late in the afternoon and continued throughout the night and far into the next morning, with vivid lightning and heavy thunder. Possibly the proximity of the high peak (Parish peak) of Itabru mountain had something to do with this downpour, and it was noticeable that along this district, though the dry season was well advanced, frequent and heavy showers fell, thus causing the river to maintain a full body of water.

Late on Monday morning, after the rain, we started, and soon came upon one of the gold-diggers'

camps, where they were cutting a path to the Corentyne under the impression that they were above the Christmas cataracts—the tedious Savannah rapids having being mistaken for that set. Another expedition which had not reached so high as this point, had in the meantime gone down, spreading the tale of having prospected the country for gold up to the Christmas cataracts—a mistake due to their ignorance of the description which had been given of this set.

The higher we ascended, the more numerous became the rapids—the river winding very considerably, much broken up with rocks and small tree-clad islands, and the banks much raised and covered with a magnificent forest growth of mora, greenheart, crab-wood, wallaba, arrisourou, marciballi, dalli etc. Here and there a few tall manicoles were to be seen, but up to this point palms had been few and far between by the river-side, though, within the forest, toorou and cokeritiballi were to be met with, often in great numbers. On the slopes of the hill, where the Monday evening's camp was made, at the foot of a small but loud-roaring cataract, the plants grew in great abundance, and gave a welcome shelter, in the form of a rude benab, from the heavy rain which fell soon after, accompanied by frequent lightning and thunder.

It was at this place, which presented the appearance of being the site of an old camping ground—possibly used by SCHOMBURGK and BARRINGTON BROWN—that we caught the only snake met with on the trip. The specimen was of small size, being about 18 inches in length, of a dull green colour, spotted along the back with purple. It was a perfectly harmless species and

referable to the genus *Dryophylax*. It was found living on a decumbent greenish-brown trunk of a tree, on which it could with difficulty be seen, and when caught made vigorous attempts to bite. The teeth, however, were so small, that they scarcely made more than minute punctures.

With the exception of a smaller cataract further up, this is the last of any importance before the Christmas set is reached. Above, the current is very rapid over a sloping basin, at the head of which the river curves sharply round to the East bank, thus giving rise to a long open recess of great beauty, where the banks are hilly and are covered with immense forest trees. A shorter channel, cutting off this recess, and separated from it by a tree-clad island, is to be found on the South bank, but it is formed of a rocky bed with a series of cascades.

Above this point, the rapids became more frequent, and partook of the nature of the broad and shallow Savannah rapids, the strong rush of the water causing considerable difficulty in getting the bateau through. The banks were elevated and covered with a high forest growth, among which the chief hard-wood trees were to be distinguished. Souari and hyawa trees became common, and splendid clumps of the cokerite more frequent, while manicoles too were seen at intervals. The crab-eye or buck bean with its handsome black and red beads was to be found in abundance, but chiefly small trees, though one, with peculiarly small leaves, stretched gauntly like a giant, upwards and outwards over the river.

Iguanas became even more common than they had been lower down, and their splashing, as they threw

themselves from the high branches into the river, were constantly heard. Alligators were met with for the first time among two of the higher rapids. One specimen (*Alligator palpebrosus*) was secured with a charge of slugs, and skinned, the reptile being unusually and intolerably musky; while another, of a different species (*A. sclerops*), though nearly drawn into the boat, managed by some vigorous strokes of its tail, to effect its escape, and was lost amid the thick masses of the common sheet-like creepers along the riverside. Otters were commonly met with in large flocks, and two large specimens were shot, but being in deep water it was out of the question to get them. Perai of the common species were still abundant and were most easily caught—and their flesh formed a pleasant change—though the Indians who had been with us lower down, gave their dictum that “Peraï bring fever.”

Among the masses of creepers which curtained the banks, a great variety of insects was to be found, but as a rule they were not easy to reach. Two or three species of the tortoise or helmet beetle (*Cassida*) were secured, the most common being of a fine green colour with a large yellow blotch on each elytron, almost undistinguishable at a little distance from the green surface of the leaves, where the yellow blotches seemed like yellow decaying spots on the leaf itself.

It was curious how, in nearly all the insects found on these creepers, their colours offered more or less certain protection. With the exception of a small brownish grey proboscis beetle (*Rhynchophorus*), found either on the yellow fading leaves or on the yellow flowers of the creeper, on which it was with difficulty distinguished owing

to its body being covered with an abundant yellow powder, the specimens were of a greenish hue, variably marked with spots of other colours, chiefly resembling those on the leaves themselves. Green grasshoppers and locusts were very abundant, together with the common *Mantis*, and various spiders; while occasionally specimens of *Hemiptera* were met with, one, a species of *Membracis*, being chiefly remarkable owing to its large and pointed crested thorax, the anterior wings being of a deep green, striped with obscure red lines, and somewhat like the venation of the leaves of the creeper. High overhead, and quite out of reach, were to be seen magnificent specimens of the flattened silver spider (*Argiope argentata*), and the thick-bodied nephila (*Nephila clavipes*), with immense webs spread out over the curtain-like masses of leaves.

Late on Tuesday evening we passed through considerably elevated land, and a small creek joined the river on the East bank, rushing and roaring down the slope. Immediately beyond, a large island breaks up the channel, the passage on the left bank curving out into a deep bend, the whole distance being almost a continuous rapid with a very strong rush of water; while that on the right, shorter and more like a cataract, leads across directly to the upper side of the island, where a long curving and shallow rapid, like the Savannah rapids, and with a total height at least of about 15 feet, opens to the view. The channel was rendered very beautiful owing to the masses of the flowering water-weeds (*Lacis, etc.*) which are here particularly abundant and of large size—a point of beauty quite unappreciated by the hands, who found the bed extremely

slippery, and crowded with loose and sharp-edged masses of the quartz-porphyry which is the common surface rock of the district.

After passing this obstruction, three more rapids, one long and very inclined, are encountered ere the foam from the Christmas cataracts is met with and the rush of its waters heard. Rounding the bend of the river from North to East, a magnificent panorama of the rushing waters of the cataracts bursts upon the view.

The whole scene, as one turns suddenly round the corner, is altogether superb, and is very different from the painting given by SCHOMBURGK in the "Views in the Interior of Guiana," where the first cataract is represented as seen from the side. In the foreground, the foaming flowing stream is backed by a high irregular dyke of pinnacled rock, about 8 feet above the level, through which rush variably sized channels of foaming water, breaking up into white masses as they tumble over the rocks; while beyond, in the distance, seen over the dark dyke, appears a higher cataract looking like terraces of rock and rushing foaming water, studded with rocky and tree-clad islands, the centre of the cataract a steep foaming torrent, sloping outwards into alternate masses of rock and water—the contrast being heightened by the red and dark colouring of the rocks; while in the background rises the tall forest, clad with flowing drapery of green creepers, hanging like curtains across the field of view, and passing outwards to the sides, following the high arching of the forest on the steep banks.

The set of cataracts really consists of four, but the upper two are hidden from below by a bend of the river. The first dyke is formed of a hard and close *felstone*,

in many parts closely resembling flint in appearance : the second consists of *greenstone* ; while the third and fourth are composed of *felstone* and *quartz-porphry*. The felstone is remarkable for its fineness, and its close and parallel jointing, along the lines of which the chief weathering takes place—the surface being often covered with a rusty coating.

Here and there, the rock is hollowed out into deep and wide basins, the sides of which are sometimes smooth, though usually rough and sharp-edged according to the lines of jointing. Along these channels on the South side of the first dyke and in the centre, the main mass of the river discharges itself, but several little tracts are to be found along the course of the dyke, the whole or the greater part of which must be covered with water during the heavy wet season. Even during our short stay of a few days, the river fell about two feet, leaving numerous isolated rock pools. Along the various channels and over the greater part of the moist rocks, the water-weeds (*Lacis, etc.*) are very abundant, and the dry rock is covered with a thick felt of their remains.

Above the set of cataracts, the river flows towards the North, but it gradually curves round towards the West, and at the foot of the second dyke, flows in a more south-westerly direction to the first dyke ; though owing to numerous nearly submerged bars, the chief rush of water over the steep bed takes on repeatedly S-like curves in all directions. Along the eastern face of the first dyke, which crosses from North to South, the river rushes to the South end, forcing its way through and over the barrier, rushing, splashing, and roaring in huge

basins hollowed out of the hard felstone; while, below, it winds away again to its normal course, flecked with masses of foam.

The attractiveness of the scene was heightened by the abundant growth of the wild guava (*Psidium*), in full flower, on the rocks; and their delicate fragrance imparted a delightful balminess to the air, thoroughly appreciated by crowds of tiny yellow bees which hovered over the flowers. Along the sides of the steep banks, masses of coarse and rank-growing aroids were conspicuous, mingled with ferns of different kinds, from the delicate thread-like and filmy-leaved species to those with large spreading divided and undivided fronds, while selaginellas were scattered in all directions. On the trees along the sides, and on the islands, masses of orchids grew, several in flower, chiefly species of *Epidendron*, *Brassavola*, *Batemannia*, *Brassia*, *Diacrum*, *Schomburgkia*, *Stanhopea* and *Huntleya*, though the most tempting clumps were always high out of reach on some huge tree by the waterside.

Palms were represented by an occasional manicole, cokerite, cokeritiballi and tooroo, but the most abundant was a strong-growing pimpler-palm, called *carya* by the Indians, much like a young tooroo in growth, but with the stem and the back of the leaves covered with long prickles, and the fruit like minute bunches of cocoanuts, covered with small, close, short spines, and filled with water. Mora, greenheart, crab-wood, wallaba, kabukalli, marciballi, bullet-tree, etc., formed the great bulk of the trees, as had been the case along the lower valley.

Several days were devoted to working up the district, but it proved poor for our purposes. Powis, maam,

maroodie and bill-birds, were fairly common, and a few were procured. Parrots, macaws, bell-birds and rarer species, were heard in the high-tree tops, but it was extremely seldom that a shot could be got at them. Once a wide column of the yackman ants was encountered, and considerable difficulty met with in avoiding them. Crowds of the small ant-thrushes, bush-shrikes and creepers, like *Rhopoterpe* and *Chiromachæris*, *Dendrornis* etc., were pursuing, chirping loudly as they followed their course, but in the darkness of the close undergrowth it was not easy to see them. Several hemipterous insects were met with, and a small *Diactor*, destitute of cross stripe or spots.

Bush ticks, large and small, but more especially the latter, were extremely plentiful, and were a continual pest; though few things in my experience equalled an attack from the species of *Polistes* that constructs the pear-shaped, grey nests (with their aperture below), so frequently brought to town for sale. While crossing a creek on a tacooba, a swarm of these wasps suddenly rose around me and settled on face, neck and hands, and sent me rushing recklessly through the bush, minus gun and compasses which I had thrown aside in sudden agony. The stings were like the sudden application of so many red-hot irons, and the effect lasted for hours, though to a less degree.

We had started cutting a track to the Corentyne from the point where the river curved away from the East, but after two or three miles this was given up, since we met with nothing in the way to repay us for the time and labour. The track had led along the river side for about a mile, beyond the second

cataraft, and across two creeks, the bed-rocks of which were composed of quartz-porphry and greenstone. A magnificent view of the second cataraft is obtained from this side, where the huge dyke of greenstone is seen rising in broken terraces for about 20 feet, cut back in the middle for some distance so as to form a steeply sloping amphitheatre, down which the water rushes in one continuous mass with a noise like the distant rumbling of thunder; while at the open sides great masses of rocks and tree-clad islands break up the rushing waters into numerous foaming channels, till they are lost against the forest on the high banks, which, with their pendent creepers, close in the river. Higher up, the two further catarafts are seen; but these, though fine, are much less grand than the second.

A day's journey through the forest and along the West bank was made above the set of catarafts, where the land gradually becomes less elevated, and swamps again began to make their appearance, the course of the river being quite unobstructed; but except a good specimen of *Zebrilus pumilus*, nothing but common specimens of *Ibis*, *Trogon*, *Peristera*, *Columba*, &c., were met with.

On our return we sought for, but could not find, the heap of stones and tablet that marked the burial place of Mr. REISS, who was drowned while descending these catarafts during the visit of SCHOMBURGK.

It is a notable thing that during the whole time of my visit to the Upper Berbice, not a single cayman (*Alligator niger*) came under notice, while during the visits of SCHOMBURGK and BARRINGTON BROWN, to judge from their written accounts, these reptiles were remarkably abundant, and were obtainable at all parts

of the course—the latter traveller making the observation that “From the foot of Itabru upwards, the Berbice river is, *par excellence*, the home of the cayman.” This was, to say the least of it, a keen disappointment to me, since I had felt secure, whatever else might fail me, in being able to bring back a dozen skins or so, of these huge reptiles. Curiously enough, since my return to town, I have been informed by one of the gold-prospectors that they too met with the cayman, apparently some of the largest of their kind, just above the Christmas cataracts,

Finding this upper district so unsatisfactory for collecting purposes, I determined on the 19th to return to the lower parts, where the open savannahs and the larger creeks might afford more opportunities; but almost from the start, I was incapacitated for work by fever, which, as time passed, became more and more severe. On the 21st, when just in view of Parish Peak, I determined to see what we might procure from the high hill; and we accordingly struck out by the compass for the mural precipices, where there is a bare escarpment of the pink and mottled sandstone and conglomerate layers, with an immense talus of boulders at the base composed of these same rocks—the quartz pebbles of the conglomerate being nearly all rounded and smooth. After a few hours’ walking we reached the base, where the mountain rose suddenly, and so precipitously that tracks had to be sought where the roots and stems of the small trees, growing on the face, gave a means of planting one’s feet and pulling oneself up. Beyond the magnificence of the view from North to South over the expanse of green forest to the horizon, broken in the distance by a few

hills, we met with no reward for the arduous climb ; and with fever on me, I regretted the excursion.


Just at this point of the river, we met with a passion-flower, quite new to me, which, if it would but grow by the coast, would be a most desirable garden ornament. Unfortunately no seeds were to be found on the plants. The vine was of stout habit, with ovate-oblong leaves, and stiff flowers, with an extremely fragrant scent ; corolla and calyx white ; corona yellow on top and pink inside, stiff and much divided into fibrils, but of a deep, cup-shaped form ; stamens and pistil greenish yellow.

We ran down the river by easy stages to Itabru, where I was obliged to camp for a few days owing to the extreme weakness and the violent nausea and retching which accompanied the fever. The taxidermist too, who had been suffering slightly from the same cause, became quite prostrated ; and as the work of the expedition was thus brought to a complete stand still, I judged it wiser to return to Coomacka, where we arrived on the 29th ; and being quite unable to carry on any work, we took steamer for New Amsterdam.

This had been my first experience of fever while travelling in the interior, and, unfortunately, it was of such severity as to render the close of the expedition absolutely barren of results. During the greater part of the trip, however, we had been fairly successful, so that a large and miscellaneous collection had secured the expedition from being a failure.

The Barbados Sugar Cane Experiments.

By J. B. Harrison, M.A., F.G.S., F.C.S., Etc., Government Analytical Chemist.

 IN 1879 the establishment of manurial experiments with the sugar cane was contemplated by the Government of Barbados, and upon my appointment in May of that year to the post of Island Professor of Chemistry and Agricultural Science, before I left England I received instructions to make myself acquainted with the methods employed in experimental agricultural research, and I was enabled to do this through the kindness of Sir JOHN LAWES and Dr. GILBERT, who invited me to visit Rothamsted and study the the methods there used. On account of the satisfactory prices which were obtained for sugar in 1880 and the two following years, and of favourable climatic conditions producing large crops, the matter was dropped, or, rather, was only spasmodically alluded to.

Sir WILLIAM ROBINSON, then Governor of the island, however, fully recognised its importance and informed me that as soon as the Reformatory and Industrial School which was then proposed to be established at Dodds was fairly started, he would take steps to enable such experiments to be carried on there. He consulted Mr. MORRIS, at that time Director of the Botanical Department in Jamaica, upon the subject, who advised him that it was desirable experiments should be made with varieties of canes in order that a kind preferable to the Bourbon cane might be found. Sir WILLIAM referred this matter to the Agricultural Society, who

appointed a committee of which I was a member, to consider it. The opinion of the committee was that there appeared to be but little likelihood of a cane superior to the Bourbon being found, but considered that the experiments might be useful. In consequence Sir WILLIAM asked Mr. MORRIS to select varieties of canes which he considered to be likely to suit the soils and climate of Barbados, and towards the end of 1884 a selection of canes was received from Jamaica and their experimental cultivation commenced at Dodds. About the same time I consulted with Mr. BOVELL the Superintendent of the Reformatory as to the feasibility of making manurial experiments there also, and we applied to the Executive for permission to carry out a series of such experiments. Permission was granted, but with the proviso that no expenditure beyond that necessary for the cultivation of the land in the ordinary way was to be incurred, and until 1889 any expenses incurred for necessary apparatus, etc., were paid by Mr. BOVELL and myself.

In selecting the fields for the experiments with manures we carefully kept in view the fact that for the action of the constituents of manures to be accentuated sufficiently for their study, the soil must be one of low fertility, deficient in the constituents of plant food the manurial value of which is desired to be determined, but at the same time having favourable mechanical properties and good drainage. Two fields having this character in a well-marked degree were selected and used for the experiments. The soil upon them is a fairly light clay loam resting upon porous coral limestone, thus having excellent natural drainage. The soil is thin, being from

eighteen inches to two feet in depth, and as the following determinations show, deficient in nitrogen, phosphoric anhydride and potash :—

	No. 1.	No. 2.
Nitrogen	'102	'154
Phosphoric anhydride	'079	'097
Potash	'106	'095

For the experiments with varieties of canes we selected more fertile fields, as shown by the following :—

Nitrogen	'102 per cent.
Phosphoric anhydride	'198 „
Potash	'242 „

During the crops of 1887, 1888, 1889 and 1890, the rainfall and climatic conditions at Dodds were exceptionally favourable for the growth of the sugar cane, and it is the results of the experiments during these years of which I intend to give a brief resumé, as from the deficiency of the soil in the more important constituents of plant food, its excellent mechanical condition and first-rate tillage and the very favourable seasons, the results obtained at Dodds appear to be of great importance with regard to the manurial requirements of the sugar cane, and may, to some extent, assist us in this colony in the selection of manures for use in its cultivation. The first year's experiments being mainly devoted to ascertaining the more promising lines of investigation to take up, and also being greatly affected by drought, I have not, with one exception, considered their results, but I may mention that they were in full accordance with those since obtained. The following shows the age of the canes when reaped in each year, the rainfall during the growth of the crop,

and the average weight of canes per acre obtained in the district:—

Crop of	Age of Canes.	Rainfall.	Yield per Acre.
1887 ...	17 months ...	85'58 inches ...	30 tons 13'5 cwts,
1888 ...	17 „ ...	75'99 „ ...	29 „ 12 „
1889 ...	15 „ ...	64'84 „ ...	31 „ 7'4 „
1890 ...	15 „ ...	75'95 „ ...	41 „ 1 „

Experiments with Nitrogen.

In this portion of the experiments the object in view was to ascertain : 1st, the requirements of the canes for nitrogen ; and 2nd, whether the canes were able to make more complete use of nitrogen according to the source from which it is derived. As the specific action of any manurial substance can only be developed for its study upon either soil or plant when the other necessary ingredients of plant food are present in relative excess, in each year the plots used were manured with such proportions of superphosphate of lime and of sulphate of potash as our experience had shown to be in excess of the requirements of the canes upon the Dodds' soil. One plot was also yearly manured with heavy dressings (20 tons per acre) of pen manure and other plots left unmanured. Of the plots manured with superphosphate and potash, one received nothing in addition, the others nitrogen applied in different forms and proportions. I propose here to consider only the results obtained by the application of nitrogen in quantities of 40 and 80 lbs. per acre in the forms of sulphate of ammonia, nitrate of soda and of mixtures of dried blood and sulphate of ammonia. The average yearly results are given in the following table:—

	Weight of Canes per acre.		Extraction of juice per Cwt.	Gallons of juice per acre.	Specific Gravity.	Degree Beaumé.	Lbs. per Gallon.		Purity.	Lbs. of Sucrose in juice per acre.	Gain by Manuring upon no Manure.	
	Tons.	Cwt.					Sucrose.	Glucose.			Cwts. of canes.	Lbs. of Su- crose in juice.
No Manure ...	19	10.5	56.6	2,280	1088	11.7	2.049	.055	89.5	4,671	116.1	1,625
Sulphate Potash Superphosphate }	25	6.6	58.7	3,070	1087	11.6	2.061	.057	90.5	6,296		
Sulph. Ammonia = 40 lbs. Nitrogen }	32	12.4	59.9	4,030	1087	11.6	2.054	.054	89.7	8,277	261.9	3,606
Sulph. Ammonia = 80 lbs. Nitrogen }	37	7	61.1	4,720	1085	11.3	1.951	.074	88.7	9,208	356.5	4,537
Nitrate of Soda ... 40 lbs. Nitrogen }	29	6.1	60.8	3,678	1086	11.5	2.015	.064	88.9	7,411	195.6	2,746
Nitrate of Soda 80 lbs. Nitrogen }	31	11.1	61.5	4,010	1086	11.4	1.979	.081	88.3	7,935	240.6	3,264
Dried Blood, &c. Sulph. Ammonia 40 lbs. Nitrogen }	31	8.6	62	4,030	1085	11.3	1.934	.076	87.6	7,794	238.1	3,123
Dried Blood Sulph. Ammonia 80 lbs. Nitrogen }	33	4.3	61	4,194	1084	11.2	1.914	.074	87.7	8,027	273.8	3,456
Pen Manure ...	33	1.4	60.6	4,145	1084	11.31	1.914	.062	88.1	8,057	270.9	3,366

Sulphate Potash Superphosphate.

With the exception of the crop of 1887, in each year manurings with superphosphate and potash salts have given considerable increases in yield upon the unmanured plots, showing the deficiency in the soil of phosphoric anhydride and potash, and also that owing to the favourable mechanical condition of the soil, sufficient of the soil nitrogen underwent nitrification to supply that necessary for the increased yield. In every case the addition of 40 lbs. of nitrogen per acre produced large increases in the yield, whilst the addition of another 40 lbs. still further increased it, although not to the same extent. This is best seen in the following comparison of the average yields of the plots without nitrogen, and of all the plots with 40 lbs. and with 80 lbs. of nitrogen :—

	Weight of canes per acre.		Extract of juice per cent.	Gallons of juice per acre.	Specific Gravity.	Degree Beaumé.	Lbs. per Gallon of		Purity.	Lbs. of Su- crose per acre.	Gain by addition of Nitrogen.	
	tns.	cwt.					Su- crose.	Glu- cose.			Cwts. of Canes.	Lbs. Su- crose.
No Nitrogen....	25	6.6	58.7	3,070	1087	11.6	2.051	.057	90.5	6,296		
40 lbs. Nitrogen	31	1.8	60.8	3,902	1086	11.5	2.007	.064	88.6	7,831	115.2	1,535
80 lbs. Nitrogen	34	2.3	61.1	4,311	1085	11.3	1.951	.076	87.7	8,410	175.7	2,114

From these results we may safely conclude that, like others of the gramineæ the cane requires nitrogen ; that manuring with nitrogen up to a certain amount will yield increased crops, but that these increases rapidly diminish in amount where manurings of over 40 lbs. of nitrogen per acre are applied. From my experience, both of these experiments and of others, I am of opinion that from 40 to 50 lbs. of nitrogen per acre (equivalent to from 200 to 250 lbs. of sulphate of ammonia) is, in the majority of cases, an ample manuring

with nitrogen, and that heavier manurings, although probably giving greater returns of canes, will not result in increased profit but probably in loss, such loss being the greater the more unfavourable the climatic conditions are for continued growth during the later periods of the crop. As regards the influence of increased nitrogenous manurings upon the composition of the juice, the experiments have shown that the juice yielded by the higher dressings of nitrogen was almost invariably of lower saccharine richness than that yielded by the lower, showing that the canes had not been able to make as complete use of the high dressing during their growth as of the low ones. My experience is that the limit of application of nitrogenous manures so as not to in any way affect the saccharine richness of the canes, is from 50 to 60 lbs. of nitrogen per acre, equivalent to from 250 to 300 lbs. of sulphate of ammonia.

As regards the form of nitrogen which the canes made use of most completely, the results of the experiments speak strongly. When the experiments were commenced I hoped and expected that we should find, as in the majority of experiments with the gramineæ, nitrate of soda a preferable source of nitrogen to sulphate of ammonia, but the opposite proved to be the case. In each year's experiments, including those of 1886, nitrate of soda proved to be far less efficacious than sulphate of ammonia, and this was the more marked where the higher amounts were applied. Doubtless much of this difference was due to the shallowness of the soil at Dodds, and to heavy tropical rains occurring soon after the application of the manure causing great loss of nitrogen by drainage and surface washing, this

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loss necessarily being greater with nitrate of soda, for which the soil has no retentive power, than with sulphate of ammonia; but we find that, in almost all other experiments as yet made, sulphate of ammonia has given, though in very varying degrees, more satisfactory results with the sugar cane than nitrate of soda. At Dodds, since 1885, the application of sulphate of ammonia and nitrate of soda in quantities supplying equal proportions of nitrogen was made the subject of twenty-five strictly comparative experiments, in two only of which nitrate of soda gave the better result. The following shews the average results of these experiments:—

	Weight canes $\frac{\text{t}}{\text{a}}$		Extraction of juice $\frac{\text{t}}{\text{a}}$	Galls. of juice per acre.	Specific Gravity.	Degree Beaumé.	Lbs. per Gallon.		Purity.	Lbs. of Su- crose in juice per acre.	Gain by use of Sulphate of Ammonia.	
	tns.	cwt.					Su- crose	Glu- cose.			Cwts. of Canes	Sucrose in juice. lbs.
Nitrate of Soda	27	8	60.5	3,425	1086	11.4	1.988	.093	88.8	6,808		
Sulphate of } Ammonia. }	29	18.3	61.2	3,780	1085	11.3	1.963	.075	89.	7,420	50.3	612

Mixtures of dried blood and sulphate of ammonia did not give equally favourable results as the use of sulphate of ammonia alone, but gave better results than those obtained with nitrate of soda. These experiments were made to test the truth of the assertions often made by makers of commercial sugar cane manures about the great advantage of the supply of nitrogen to the cane being gradual, and that this advantage is obtained in their manures by judicious mixtures of nitrates, ammonia salts and nitrogenous organic matters. The results of the experiments showed that these advantages, if they do exist, are of but little value, and agree with an opinion I had expressed many years ago; that the

cane at the commencement of its stage of active growth as determined by the rainfall, requires, and can make use of, full applications of active nitrogenous manures, and that it does not require a further slow supply of nitrogen during the later stages of its growth. It is noticeable that the juice yielded by the canes receiving their nitrogen partly in the form of organic matters was never as rich as that yielded by the active nitrogenous manurings. This may of course be due to some other causes, but to my mind it suggests that the slow supply of nitrogen retarded the growth and ripening of the canes to an extent that was not desirable, and this opinion was borne out by the similar results given by the yields obtained from the fields heavily manured with pen manure.

It is of some interest to ascertain the proportion of the nitrogen added in the manure which was recovered in the produce. From experiments made, we have ascertained that of 100 lbs. of total produce of the sugar cane, 17 lbs. will consist of fallen or stripped leaves (calculated in their green state), and from this and the weights of canes and cane tops yielded, we find that the average total produce without nitrogen amounted to 80,222 lbs., with 40 lbs. of nitrogen to 95,566 lbs. and with 80 lbs. to 103,455. Analyses showed that the produce without nitrogen contained .093 per cent. of nitrogen, that with 40 lbs. .089 per cent., and that with 80 lbs. .102 per cent. The produce, grown without nitrogen, therefore, contained 74.7 lbs. of nitrogen, that grown with 40 lbs., 85.1 lbs., and that with 80 lbs. 105.5 lbs. We have then on an average that where 40 lbs. of nitrogen had been supplied as manure, 10.4 lbs. were

recovered in the produce, whilst where 80 lbs. were used 30·8 lbs. were recovered. If, however, we calculate the amount recovered, not on the average increased yields obtained by addition of nitrogenous manures, but only upon the very concordant results obtained in the crops of 1888 and 1890, during the growth of both of which the climatic conditions were most favourable for nitrogenous manurings, with the manure the nitrogen of which the cane appeared to make the most complete use of, we find that the increase due to manuring with 40 lbs. of nitrogen applied as sulphate of ammonia was 23,979 lbs., and that with 80 lbs. was 43,587 lbs. In the produce of the first there were recovered 18·01 lbs., and in that of the second 51·95 lbs., or 45 and 65 per cent. of the added nitrogen respectively, as compared with the 68 per cent. stated by Dr. WAGNER to be recoverable in the produce of many European crops.*

Experiments with Phosphates.

These experiments were made with the object of ascertaining the importance of phosphoric anhydride as a constituent of sugar cane manures, the proportions of it most advantageous, and as to whether insoluble phosphate of lime could, with advantage, supersede the use of superphosphate of lime. The portions of the fields upon which these experiments were carried out are considerably more fertile than those used with the experiments with nitrogen, producing on an average four tons of

* The relatively high proportion of nitrogen recovered where 80 lbs. had been applied was due not so much to the increased yield as to the high proportion of nitrogen present in the whole of the produce.

canes more per acre. The fields used were all manured with nitrogen and potash in proportions somewhat in excess of the manurial requirements of the canes, whilst some plots received nothing in addition, others, superphosphate of lime in proportions averaging 75, 112, and 150 lbs. of "soluble phosphates" per acre, respectively, and the remainder insoluble phosphates (mineral and precipitated phosphates) in quantities equivalent in money value to the lowest and highest dressings of superphosphate used. The following table gives the average result of these experiments :—

	No of phos- phates	Weight of canes per acre.		Extraction of juice per cent.	Gallons of juice per acre.	Specific Gravity.	Density Reaumé.	Lbs. per Gallon.		Purity.	Lbs. of Su- crose in juice per acre.	Gain by addition of Phosphates.	
		tns.	cwt					Su- crose.	Glu- cose.			Cwts. of Canes.	lbs. su- gar in juice.
Superphosphate.	No 1 phos- phates	31	11.9	61.4	4,008	1087	11.5	2.016	.073	89	8,080		
	{ 75 lbs. solu- ble phos- phates }	35	2.6	60.9	4,422	1087	11.5	2.036	.057	90	9,003	70.7	923
	{ 112 lbs. solu- ble phos- phates }	33	7.1	61.5	4,284	1085	11.3	1.989	.081	90.1	8,520	35.2	440
	{ 150 lbs. solu- ble phos- phates }	31	14	60.6	3,970	1087	11.3	2.022	.074	89	8,027	2.3	nil.
Insoluble Phosphates.	{ Single dressing }	32	1	60.6	4,017	1084	11.2	1.963	.072	90	7,885	9.1	nil.
	{ Double dressing }	33	5.3	61.8	4,252	1083	11.1	1.916	.076	88.8	8,148	33.4	68

The above results show that a great increase was produced in the yields of canes and of sugar by the use of superphosphate of lime in moderate quantity (equivalent to about 250 lbs. per acre of an ordinary 30 per cent. superphosphate); and that the use of larger amounts was

not followed by corresponding increases, but by decreases in the yields. The latter results would appear as though due to errors in the experiments if it were not that they were almost universal during the experiments, on two occasions only plots exceeded in yield those given 75 lbs., in one of which also the yield produced by 150 lbs. was higher than that by 75 lbs., but lower than that produced by 112 lbs. These results can not be due to the phosphoric anhydride contained in the manure, as the sign of the amount of this substance necessary for the plants being exceeded would have been diminished rate of increase by increased manurings, and not diminished yields, but were in my opinion due to the acidity of the superphosphate injuriously affecting the rootlets of the canes—this, when the superphosphate is applied in large quantities, not being sufficiently rapidly neutralised by the active lime (calcium carbonate in the fine soil), present in the soil of the plots. As the active lime present in the soils of these fields amounted in one case to .22 per cent., and in the other to .72 per cent., the results point to the necessity of great caution in the application of superphosphates to our Demerara soils, in the majority of which the amount of active lime present is nil.

The experiments with insoluble phosphates showed, but poor results, their action being scarcely appreciable; this was probably due to the Dodds' soils, in common with the great majority of Barbados soils and with many of our soils here, being very poor in organic matters, so that the organic acids and carbonic anhydride set free in the soil by oxidation were not sufficient to influence the solubility of the phosphates.

By analysis the produce grown without phosphates was found to contain on an average '071 per cent. of phosphoric anhydride, and that grown with phosphates '086 per cent. The total produce (canes, cane tops, and fallen leaves), without phosphates, therefore, contained 69·5 lbs. of phosphoric anhydride as compared with 93 lbs. found in the produce of the plots manured with 75 lbs. of soluble phosphates. We find that where the phosphates have exerted the most beneficial influence 51·2 lbs. of calcium phosphate have been recovered from a manuring supplying an average of 83 lbs. of soluble and insoluble phosphates, or that 61·7 per cent. of the phosphates applied have been recovered in the yield.

Experiments with Potash.

These experiments were conducted upon a soil not so fertile as that used for the experiments with phosphates, but capable of yielding from $1\frac{1}{2}$ to 2 tons more canes per acre than that used for the nitrogen experiments. The experiments were only to test the importance of potash when applied to the sugar cane in the form of sulphate of potash, although some attempts were made to ascertain the best time for such application, but the results obtained were not sufficiently numerous or so well marked as to warrant any reference to them. All the fields were manured with superphosphate and nitrogen, some receiving no potash, the others sulphate of potash in quantities supplying, on an average, 40, 60, and 80 lbs. of potash per acre respectively. The following table shows the average results obtained :—

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	Weight of Canes.		Extraction of juice % cent.	Gallons of juice $\frac{1}{2}$ acre	Specific Gravity.	Degree Beaumé.	Lbs. per Gallon.		Purity.	Lbs. of Su- crose in juice $\frac{1}{2}$ acre	Gain by addition of Potash.	
	tns.	cwt					Su- crose.	Glu- cose.			Cwts. of Canes.	Lbs. Su- crose in juice.
No Potash ...	29	15.6	6.13	3,765	1086	11.4	1.955	.084	87.2	7,360		
40 lbs. Potash	32	5.3	62.3	4,157	1084	11.2	1.981	.064	90.8	8,239	49.7	879
60 lbs. Potash	33	3.6	62.1	4,258	1086	11.4	1.990	.061	88.8	8,475	68.	1,115
80 lbs. Potash	34 $\frac{1}{2}$	1.8	62.5	4,404	1086	11.4	2.015	.062	89.9	8,874	86.2	1,514

It is evident that in the soils at Dodds, deficient in potash, largely increased yields of canes were attained by the addition of potash salts to the manures used, and from the continued increase by the increased amounts of potash, it appeared that this substance exerted a marked influence upon the yield of the sugar cane, and possibly a slight one upon the sugar contents of the juice ; and as these results were consistent all through the experiments, their value is far greater than if deduced merely from an average of experiments not in strict accordance.

The produce obtained without potash in the manure, on an average, had .161 per cent. or 148.8 lbs of potash, whilst that grown with potash in the manure, averaging in amount 60 lbs. per acre, contained .188 per cent. or 191.3 of potash. Thus of the 60 lbs. applied, 42.7 lbs., equal to 71.2 per cent. of the potash applied, was recovered in the produce. The relatively high proportions of the phosphates and potash applied in the manures which have been recovered in the produce were probably due to the great deficiency of these constituents in the soil, whilst the low proportion of nitrogen recovered where it had been applied in quantities of 40 lbs. per

acre may be in part due to the loss occasioned by the well drained state of the soil.

The following conclusions may be fairly drawn from the experiments with manures :—

1. The addition of readily available nitrogen to mineral manures produces large increases in the weights of canes grown and sugar obtained, but that dressings of over 250 lbs. per acre of sulphate of ammonia do not produce corresponding increases under ordinary climatic conditions, and may cause a marked decrease in the richness and purity of the juice.

2. The most favourable form in which nitrogen can be employed for manuring the sugar cane, appears to be sulphate of ammonia, no advantage appearing to be gained by the use of mixtures of organic and ammoniacal nitrogen in its place.

3. Under climatic and soil conditions which have proved to be very favourable for the production of increased yields of sugar cane by the use of nitrogenous manures, nitrate of soda proved much inferior to sulphate of ammonia as a source of nitrogen.

4. The presence of phosphates in the manures is essential for the maximum return of sugar cane from manuring.

5. Phosphates appear to be preferable in the form of superphosphate of lime, but very great care must be exercised in its application, as whilst dressings capable of supplying from 75 to 80 lbs. per acre of "soluble phosphates" produced excellent results, dressings supplying larger quantities did not produce corresponding increases, and excessive dressings may upon soils at all deficient in active lime, yield returns but slightly

greater or even less than those obtained without them.

6. On soils, such as those at Dodds, deficient in organic matters, the use of insoluble phosphates does not appear advisable.

7. In soils at all deficient in potash, the addition of potash, in the form of sulphate of potash, to the manures gives largely increased yields, and the use of potash in large quantities does not injuriously affect the purity of the juice. It is well known that during recent years the crops of Barbados very greatly increased, and that this increase was due mainly to increased yield of canes in the field, and not to improvements in the manufacture of sugar, to which latter the majority of Barbados planters have certain rooted objections. Now, as for many years practically all the manures used in Barbados passed through my hands for analysis, having been sent either directly by the makers or by the Agricultural Society, I am in a position to state that the increased crops coincided with changes in the compositions of the manures used. Ten years ago the manures contained less nitrogen than do those used at present, a considerable proportion of the nitrogen being in the form of organic matters, high proportions of "soluble phosphates" and but little or no potash; whilst the manures used now contain their nitrogen almost entirely as sulphate of ammonia, "soluble phosphates" in much lessened proportions, and considerable quantities of potash; these changes being consistent with the deductions drawn from the Dodds experiments and thus strongly confirming them. At the same time I must mention that since 1884 large and increasing quantities of manures, known as early cane manures and containing

from 4 to 5 per cent. of nitrogen, from 16 to 20 per cent. of "soluble phosphates," and from 6 to 10 per cent. of potash, are applied to the canes soon after they spring or even to the soil shortly before the canes are planted. The use of these manures, suggested originally by Mr. GEORGE HUGHES in his report to the Barbados Agricultural Society for 1880, but the composition of which as now used, I first pointed out to the Anglo-Continental Manure Company in 1883 and 1884, has, in the general opinion of the planters, proved successful, and a high value is ascribed to them.

Are these deductions applicable to the soils and climatic conditions of this colony? From what I have seen since my arrival here, and from many soil analyses which I have since made, I am inclined to believe that the first and second are probably applicable; that the third requires experimental enquiry, as upon our heavy clay soils, reasoning from analogy with European experiments, nitrate of soda, if applied with due caution, should give fully equivalent results to sulphate of ammonia; that the fourth is fully applicable; that careful experiments require to be made with regard to the fifth and sixth; and that owing to the large quantities of potash present in many of our soils, the application of potash salts may be without beneficial action, whilst upon others and especially upon soils long under cultivation its use may be beneficial.*

What is urgently required in this colony is an agricultural experiment station, where experiments would be

* By the system adopted here of leaving the fallen and stripped leaves and the tops of the canes upon the land, about 64 per cent. of the potash taken up by the crop is at once restored to the soil.

carried on under strict scientific control, both botanical and chemical, and upon the lines and with the methods pointed out by modern agricultural research.

Experiments with varieties of Canes.

Experiments with certain varieties of canes received from Jamaica and selected by Mr. MORRIS as specially suited to Barbados, and with varieties previously cultivated there, were systematically made at Dodds, and by Mr. ARMSTRONG at Little Island where the rainfall and soil conditions differ greatly from those at Dodds and have a greater resemblance to those occurring here, with a limited number of varieties. The average results of the experiments at Dodds are given in the following table, the names used for the varieties being those adopted by Mr. JENMAN. In the table, under the name of Bourbon are included the results obtained with the Bourbon and Lahaina canes, under that of Red Ribbon cane, those with the Red Ribbon and Striped Singapore, under that of White Transparent those with White Transparent, Rappoe and Caledonian Queen, under that of Purple Transparent those with the Meera, Purple Transparent and Queensland Creole, and under Salangore those with the Salangore and White Mauritius, these names being merely synonyms and not names of true varieties:—

Names of Canes.	Weight of Canes.		Extraction of juice per cent.	Gallons of Juice $\frac{1}{2}$ acre.	Specific Gravity.	Degree Beaumé.	Lbs per gallons of		Purity.	Lbs of Sucrose in juice $\frac{1}{2}$ acre	Lbs. less of Sucrose yielded by variety than by the Bourbon, per Acre.
	tns.	cwt					Su- crose	Glu- cose			
Bourbon ...	36	10.6	63.8	4,842	1081	10.7	1.807	.087	86	8,749	
White Trn'sprnt	30	19.3	58.5	3,743	1088	11.6	2.055	.063	90	7,691	1,058
Red Ribbon ...	29	12.3	62.2	3,806	1087	11.5	2.006	.056	88.6	7,640	1,109
Purple Trn'sprnt	31	1.7	57.8	3,720	1084	11.2	1.996	.065	90.9	7,425	1,324
Keni Keni ...	31	1.9	62	3,995	1083	11	1.837	.089	85.1	7,338	1,411
Po-a-ole ...	32	18.7	60.8	4,153	1081	10.8	1.741	.113	82.8	7,230	1,519
Mani ...	28	1.4	60.3	3,520	1077	10.3	1.677	.091	84	5,903	2,845
Elephant ...	29	8.4	58.2	3,567	1075	10.1	1.504	.100	77.1	5,363	3,386
Sacuri ...	21	11.2	60.9	2,708	1088	11.6	1.980	.078	86.6	5,362	3,387
Salangore ...	24	3	60.7	3,046	1078	10.5	1.683	.117	83.2	5,126	3,623
Bois-rouge ...	23	1.9	53.7	2,568	1086	11.3	1.910	.076	85.2	4,895	3,854
Keening ...	21	17.5	56.9	2,530	1084	11.2	1.923	.075	88.1	4,865	3,884
Meligeli ...	23	7.6	56.7	2,752	1081	10.8	1.746	.123	83.1	4,805	3,944
Jam. Elephant...	21	16.5	55.9	2,537	1079	10.6	1.744	.096	85.1	4,424	4,325
Hillii ...	19	16.8	58.7	2,418	1081	10.8	1.819	.071	86.6	4,393	4,351
Creole ...	17	2.3	54	1,916	1082	10.9	1.795	.075	84	3,439	5,310
Canne Morte ...	16	14.1	51.6	1,788	1083	11	1.895	.082	87.8	3,388	5,361
Batramic ...	18	9.9	48.2	1,849	1082	10.9	1.906	.079	89.2	3,524	5,225

* The results are interesting as showing that the Bourbon is by far the best cane at present known for cultivation at Dodds, that the White Transparent, the Red Ribbon, and the Purple Transparent Canes, which have been long cultivated in the West Indies, and which are the varieties chiefly cultivated in Louisiana, follow next, and that of the varieties selected by Mr. MORRIS, the Keni-Keni, Po-a-ole and Mani alone possess characteristics in any way qualifying them for use as sugar producers, the remaining kinds appearing to have been selected with the object of showing how bad a cane can be. These experiments at Dodds have been made only with plant canes.

At Little Island the following results were obtained with canes as plant canes and as 1st and 2nd ratoons, and are of interest as confirming the results obtained at Dodds, the Bourbon cane being conspicu-

* The Barbados and Jamaica names. Po-a-ole = Purple Mauritius. Mani = Norman. Boisrouge = Naga. Keening = Bouronappa. Meli-geli = Demerara. Canne Morte = Mamuri.

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ously to the fore, and followed by the Keni-Keni, Po-a-ole and Mani in the same order of yield as there :—

Names of Canes.	Weight of Canes.		Extraction of juice percent.	Gallons of Juice $\frac{1}{2}$ acre.	Specific Gravity.	Degree Beaumé.	Lbs. per gallon of		Purity.	Lbs. of Sucrose in juice $\frac{1}{2}$ acre	Lbs. less of Sucrose yielded by the variety than by the Bourbon.
	tns.	cwt.					Su- crose.	Glucose.			
Bourbon ...	58	9'3	65'4	7,945	1010	10'7	1'791	'059	88'2	14,230	
Keni Keni ...	49	19'3	66'8	6,900	1083	11	1'918	'043	88'8	13,234	996
Po-a-ole ...	54	12'2	74'9	8,587	1069	9'4	1'449	'121	80'9	12,442	1,788
Mani ...	51	8'1	69'1	7,408	1074	10	1'629	'076	84'5	12,067	2,163
Sacuri ...	37	18'4	61'9	4,873	1079	10'6	1'796	'062	87'4	8,752	5,478
Salangore ...	35	13'3	74'6	5,580	1068	9'3	1'465	'078	82'9	8,174	6,056
J.a.n. Elephant...	30	12'5	69'7	4,440	1077	10'3	1'725	'061	86'4	7,659	6,571
Canne Morte ...	17	19'8	66'6	2,500	1073	9'9	1'653	'075	87'3	4,132	10,098

From these two series of experiments it is evident that the Bourbon remains at present the best cane, a result strongly confirmed by the experiments carried on at the Botanic Gardens here, and we find that the majority of the canes giving results next to the Bourbon are those which have been long cultivated in the West Indies, and which, under different names, have also been obtained from other sugar producing countries. Experience, therefore, in widely different places, appears to have already selected the best canes from those known, and little chance of increased yield appears in the experimental cultivation of the known varieties. We find that certain varieties, both in Barbados and British Guiana, as a rule, yield juices richer in sucrose than the Bourbon does, and our hopes must be based upon obtaining from these varieties, by means of the seeds, canes uniting the saccharine richness of the parents with the robust habit of the Bourbon, or from the seeds of the latter, canes of greater saccharine strength.

Occasional Notes.

By the Editor.

Gold and Diamonds in British Guiana.—In the last number of *Timehri*, some statistics were given relative to the great increase in the gold industry of the colony. Here it is intended to do no more than make note of the fact that this increase has been well maintained throughout the year 1890, the total yield being over 62,615 oz., or considerably more than double that obtained in 1889. It will be remembered that for the last four years, the quantity obtained in each year has been more than double that obtained in the previous year. It is most probable that 1891 will see some specially marked progressive movement in the development of the industry. A Gold Commissioner is at last at work, whose advent, it is to be expected, will be marked by suitable regulations for the better preservation of life and property: a large syndicate is experimenting on the value of quartz-mining: a considerable amount of capital is being invested in the prosecution of extensive prospectings and workings; while the experience gained in past years will no doubt have its effect in rendering the prospectors more certain of, and trustworthy in, their operations.

It has been a matter of common knowledge for some years that diamonds were to be found in the colony; and in the account of the rocks and minerals of British Guiana given in *Timehri*, vol. iii, New Series, p. 40, the fact has been recorded not only of their being found, but examined and cut in London at the instance of Mr. GEORGE GARNETT. A new phase in the history has

been reached, however, during this last year, by the finding of more than 600 stones of good quality, in a placer along the Mazaruni, belonging to Mr. KAUFMANN. True the stones were all of small size, but still the pregnant fact remains. It appears that the diamonds occur in a thin gravelly layer between a fine white clay above and blue clay below, but the information to hand at present is, at the best, meagre.

Rice Growing in British Guiana.—More or less attention has been given at different times to the question of the desirability of growing rice for consumption in the colony, and considering the acknowledged suitability of large tracks of our lands for this purpose, and the millions of pounds of rice that are annually imported, it seems clear that a valuable industry, and one that can be prosecuted successfully by small growers and with small capital, but waits on enterprise. In Berbice, Demerara and Essequibo, numbers of people, chiefly coolies, are interested in rice-growing, but to no considerable extent; and up to the present time there has been no organised attempt to test the capabilities of such an industry.

Papers on Rice-growing by Mr. WILLIAM RUSSELL and by Mr. GILZEAN, intended for its encouragement, have been published in former numbers of this journal, but hitherto without any marked influence in bringing about such a result; while, as a guide to the best results to be obtained in the colony, samples, introduced through the agency of Mr. MITCHELL from India by Mr. RUSSELL, have been grown at Uitvlugt and have been reported upon by Mr. MINTY, in a communication

laid before the Society, 1887, in which detailed mention is made of the results of a trial of 20 of the best kinds to be grown (*Timehri*, vol. 1, New Series, p. 393). From this report, it appears that though the varieties known by the names "Oush," "Cholmowel," and "Lallhamctaroghee" are the kinds preferred by most of the coolies, they are by no means the kinds which alone are suitable for growth in the colony, or that yielded the best results.

Some years ago, the cultivation of rice at *Anna Regina*, was in an exceedingly promising condition, as shown by the paper contributed by Mr. GILZEAN to *Timehri*, 1887; but it would seem to have considerably decreased within the last year, to judge by the following short note on the subject by Mr. GILZEAN:—

The cultivation of Rice at Coffee Grove and Anna Regina has suffered from the scarcity of labour in the district for the past year. The area in cultivation has not been reduced, but the lessees of beds have in many cases allowed them to lie fallow for a few months at a time. At one time Coolies were in negotiation for 100 acres on Lima, but they put off starting operations from time to time on different pretexts. The fact is, they can earn such good wages on the sugar estates, that it would not pay them to prepare the land for Rice. There are now about 120 acres of Rice on Coffee Grove and nearly the same on Anna Regina. Formerly nearly all the Rice land on the latter estate was leased to men who agreed to work when called upon in consideration of having half the rent of \$24 an acre remitted: Now 37 men hold $17\frac{1}{2}$ acres at the full rate of \$24.

Dried Ripe Bananas.—For several years, it seems, attempts have been made, in many different places, to prepare a marketable commodity by the drying of ripe bananas, and quite recently some amount of attention was given to it in the colony through the experiments of Mr. RODWAY. At present, however, it seems to have passed again into oblivion; though in Trinidad there

are not wanting those who consider that an extensive trade will ultimately be developed there in this dried fruit. Two or three firms have taken up the matter seriously, and have prosecuted the drying operation by means of a pneumatic fruit drying apparatus, which secures the fruit being dried at a constant temperature, and thus ensures a uniformity in successive sets. The results attained in this way have been remarkably satisfactory, both in the preservation of the soft fruit and in the retention of its special flavour. Owing to the difficulty of transport, the trade in the fresh fruit is almost out of the question in many districts where they can be grown to perfection; but the conditions are entirely altered with the dried fruit, and a trade once started could be maintained uniformly throughout the year, owing to the constant supply of bananas. From the appreciation which various samples of the dried fruit have met with in London from different people, it can scarcely be doubted but that a profitable trade could be carried on in the commodity when once it were well-known; but here the crux lies:—how to establish such a trade. No doubt extensive and persistent advertising could accomplish this, the more particularly if good mention could be obtained from “high quarters.” Pioneers alone are needed: for here again lies another promising industry, awaiting enterprise—an industry in which the poorer classes, and those possessing but little capital could find ample employment in the growth of the fruit for central drying factories.

Scale Insects.—Taken in conjunction with the notes on these insects contributed to this journal by Mr. S. J.

MCINTIRE in 1889, and with the paper in this issue by Mr. R. WARD, the following short note will no doubt be of some special interest. It is taken from a communication from Mr. MCINTIRE, who at the instance of Mr. JENMAN and Mr. WARD, has so long interested himself in getting the scale-insects sent home from the Botanic Gardens, identified by specialists.

Mr. MORGAN found on *Dictyospermum album* the following coccids:—*Ischnaspis filiformis*, *Mytilaspis buxi* (one of the mussel-shaped species), and two new species of *Aspidiotus*, which he has described in the Entomological Monthly Magazine, as *A. articulatus* and *A. dictyospermi*; while on *Cupania sapida* he found another new species of the same genus which he has named *Aspidiotus longispina*.

Some brown convex *Lecanium* scales from *Cyrtanthera*, sent home in May, 1889, were at first thought to be a new species by Mr. DOUGLAS; but after breaking up most of them for antennæ, etc., he is doubtful whether they are distinct from *L. hibernaculum*.

On *Anona reticulata*, Mr. MORGAN found *Aspidiotus destructor*: on *Ænides*, he found a new species of *Aspidiotus*; and on *Bignonia pyramidalis*, a new *Lecanium*. Both of these new species will be described hereafter.

Young Aboma.—During the month of June, 1890, a fine living specimen of the aboma (*Epicrates cenchria*) was brought to the Museum in a small closed box, in which were found three eggs (one only unbroken) which had been laid by the reptile. The eggs were long and cylindrical—about 2 inches by $\frac{1}{2}$ an inch. Though kept

isolated for some time, the snake deposited no more eggs, and it was eventually placed in the large snake case, in which there were at the time two anacondas (*Eunectes murinus*), two land camoodies (*Boa constrictor*), a salem-penta lizard (*Tupinambis nigro-punctatus*), and an iguana (*Iguana tuberculata*). Now, six months after, it has just brought forth 12 young ones—a noteworthy event owing to the fact that the aboma is a land boa which is not ovo-viviparous but oviparous. The explanation is evidently to be found in the fact that the exposed position in which the snake was kept, and perhaps the wired cage, were not suited for egg-laying, and the eggs were therefore retained for the long period in the body of the mother, until they were in process of hatching when they were extruded. The occurrence, though rare, is not altogether unknown in the case of other snakes, but this is the first mention that has been given of such an event in the case of the aboma.

The young ones were about 11 inches in length, and of a very pale colour compared with the adult, the deep rich maize ground-colour being quite absent, and represented only by a greyish purple tint, though the blackish-purple rings and blotches were the same. They were remarkably lively, and as soon as they had freed themselves from the remains of the egg-membranes, they moved about rapidly, coiling the fore part of the body, and darting rapidly, and biting at any object that was presented to them. The teeth were extremely fine, and but scarcely able to puncture one's skin.

Strange as had been their advent into the world, their exit was still stranger. Placed overnight with some young specimens of the *Boa constrictor*, about three feet

in length, eleven of them had disappeared in the morning; and as there was no possible outlet by which they might have escaped, it had to be concluded that they had been consumed by their comrades, the more especially as the suspiciously swollen body of one *Boa constrictor* gave ample evidence of its voracity.

Report of the Meetings of the Society.

Meeting held on the 10th July.—Mr. R. P. Drysdale, President, in the chair.

There were 15 members present.

Elections.—*Members:* Messrs. Jas. Beatty, W. R. Spence (country), and F. Rodriguez.

Associates: Messrs. J. H. Ferreira, C. M. Shannon, John Wilson, J. W. Mace, H. G. H. Barclay, and W. H. Gray.

The Secretary read a letter from the Colonisation Committee informing the Society "that in face of the fact that the Government has appointed a Commission to enquire into the same matters for which the Committee was originally constituted, they are of opinion that there is no longer any necessity for its existence."

The Secretary read a letter from the Government requesting him to "convey to the Agricultural Committee the thanks of the Governor for the care and trouble which they have taken in filling in the question paper on Emigration drawn up by the Government of Barbados."

The Secretary read a communication from Mr. G. Garnett forwarding a copy of the letter prepared by the Committee appointed at the Special Meeting on Immigration (annexed). This had been forwarded to His Excellency the Governor, and a reply received to the effect that it had been laid before His Excellency.

To His Excellency the Viscount GORMANSTON,
K.C.M.G., Governor of British Guiana, &c., &c.

Sir,—We have the honor to inform you that at a special meeting of the Royal Agricultural and Commer-

cial Society held on the 23rd June, 1890, we, the undersigned, were appointed a Committee to bring the following resolution, which was passed unanimously, to your Excellency's notice :—

“ That in view of the prospective scarcity of agricultural labour in the near future, consequent on the great development of the gold and other industries, this meeting respectfully urges upon His Excellency the Governor, the necessity of steps being taken to introduce labourers who are willing to come under contract, from the West Indian Islands, Madeira, the Azores, Cape de Verdes, &c.”

In laying this Resolution before your Excellency, we would at the same time ask for your Excellency's kind consideration as to the following facts.

1. That except in seasons of exceptional drought the demand for labour is always in excess of the supply.
2. That a great development has, during the past two years, taken place in the gold industry, and that this industry, which is rapidly increasing, is attracting a very large and will attract an ever larger number of labourers, whilst at the same time a much larger number of labourers is required for the timber trade. The collection of ballata also attracts a large number.
3. That a new industry in the shape of banana cultivation may require more labour, whilst the intended railway to Berbice and on the West Coast will call for a number of the best and strongest labourers procurable.
4. The large bulk of our staple produce, sugar, is reaped in the last three months of the year, when it is anticipated the scarcity of labour will be very seriously felt.

5. We would, therefore, respectfully submit to your Excellency that immediate steps be taken to obviate the anticipated difficulty by the immediate introduction of immigrants from Barbados, the neighbouring West Indian Islands, Madeira, Cape de Verde Islands, or other suitable places in addition to the usual immigration from India.

6. That as this matter is of paramount importance, we would respectfully suggest to your Excellency the appointment of a Commission to ascertain what steps it is advisable to take, and to enquire from employers of labour the number of persons they are wishful of employing, and at what rates of wages and terms of contract.

7. That in the opinion of the Society, the funds of the colony could not be pledged for a better object than the increase of its labouring population, especially as each labourer must directly or indirectly contribute to the Colonial Revenue.

8. That seeing the importance of this matter and the urgent need for immediate action, we trust that your Excellency will be able to give it your early attention.

We have the honour to be,

Sir,

Your obedient servants,

(Signed)

SEAFORTH M. BELLAIRS,
S. A. HARVEY CULPEPER,
D. GIBSON,
GEORGE GARNETT.

An extract from a Circular of the West India Committee, dated June 9th, 1890, recommending the non-payment of return passages to immigrants from India, was read.

The motion standing in the name of the Colonisation Committee, for applying to the Government for free grants of Crown Lands to immigrants, was allowed to lie over in the absence of the Revd. D. J. Reynolds who had proposed the resolution.

The following samples, which had been forwarded to the Society for trial and judgment, by Mr. W. B. Van Ree, were exhibited and referred to the Commercial Committee.

Dried ripe Fig Bananas in Brandy.
Cocoa Jelly.
Cocoanut Water condensed to Casareep.
Bell-apples in Brandy.

The Secretary read a letter from Mr. D. E. Headley in answer to his request for further information in regard to the Bedford Band of Hope Industrial Show.

A copy of the Prize List was laid over, but the information not being considered sufficient, the matter was left for the consideration of the Directors.

The thanks of the Society were presented for the following donations :—

Rev. F. W. Elliott—Berbice Gazette, Jan.—June, 1812,
Mr. N. Darnell Davis—Mémoire sur les Colonies de Demerary,
Essequibo et Berbice, 1782 (MS.)

The meeting then terminated.

Meeting held on the 14th August.—Mr. R. P. Drysdale, President, in the chair.

There were 12 members present.

Elections,—*Member*: Mr. Wm. Smith, Mahaicony.

Associates: Messrs. A. Ritch, F. Agard
and G. B. Johnston.

The Secretary read a letter from Mr. D. E. Headley, informing the Society that the Committee of the Bedford Band of Hope had postponed the Industrial Show, *sine die*, owing to difficulties in connection with the "Band," and through the proposed Berbice Exhibition.

A letter from Mr. Quelch, Secretary of the Committee of Correspondence, was read, reporting that the question of a local Exhibition had been finally settled, and that it would be held in January, 1891, at New Amsterdam, under the auspices of the Society and the direct management of a committee of some of the most influential of the residents in Berbice, who had started the project in a most thorough and satisfactory manner.

The Secretary read a communication from the Government Secretary, covering an application from the Department of Agriculture, New South Wales, for agricultural publications, both scientific and statistical, in exchange for the publications of that colony. The matter was referred to the Agricultural and Commercial Committees.

The Librarian laid over specimen copies of a Supplement to the Library Catalogue, containing a list of 2,325 volumes added to the Library since the publication of the classified catalogue in March, 1888. The cost would be about \$60. The meeting approved of the work and directed the Supplement to be sold at 24 cents per copy.

The meeting then terminated.

Meeting held on the 11th September.—Mr. R. P. Drysdale, President, in the chair.

There were 10 members present.

Elections.—*Members*: Messrs. Jas Smith, and Alex. McNair.

Associates: Messrs. Thos. Fairbairn, A. F. C. Weber, Eliazer Clarke, and F. E. Reeks.

The thanks of the meeting were accorded for the following donations:—

Mr. R. G. Duncan—Guiana Chronicle, 1824.

Mr. A. Lamb, London.—International Guide.

Mr. J. Veacock.—Staunton's Chess Praxis, and Tournament.

The meeting then terminated.

Meeting held on the 9th October.—Hon. B. H. Jones, Vice-President, in the chair.

There were 10 members present.

Elections—*Members*: Revd. Jas. Millar, Messrs. W. M. Rutherford, C. S. Parker, W. A. Cruger and O. E. Swain.

Associates: Messrs. W. V. Downer, G. Allan and W. M. Howell.

The Chairman said that since the Society had last met, they had to deplore the loss of its President, the late Mr. R. P. Drysdale, who had been connected with the Society since its establishment in 1844, having been one of the original members. At many periods in the history of the Society he had rendered it very great assistance, and as Director and Chairman, had been very useful, as they all knew. He had known Mr. Drysdale personally for many years, as kind, courteous and gentle to all, always ready to lend a helping hand to the young, and to give advice and assistance to all who asked it. He thought it would be only becoming that the Society should express its sympathy with his wife and family; he therefore begged to move that a vote of condolence be

passed to his wife and family, expressing our great regret at their loss and our sympathy with them in their bereavement.

Mr. Hawtayne seconded the motion, which was carried unanimously, the Secretary being directed to write to Mrs. Drysdale in terms of the motion.

Mr. W. R. Colbeck desired to call the attention of the Book Committee to the fact that when Books are recommended and not ordered, no reason is ever given for their rejection. He thought that this might be done, by noting against the recommendation, whether it is accepted or not, and if not, the reason why.

Mr. Bayley said that he had had reason to complain of the same thing; he had made recommendations and had never seen the books or known whether they had been ordered or not. Mr. Turner thought it quite reasonable that this should be done, and the Chairman said he had no doubt that the Book Committee would carry it out in future.

The Revd. W. B. Ritchie stated that Capt. Montague Jones, an old member of the Society, wanted to have the use of the Rooms during his short visit to the Colony. The Secretary recommended that Capt. Jones have his name put in the Visitors' Book.

The thanks of the Society were given to the Revd. H. V. P. Bronkhurst for a copy of his "Descriptive and Historical Geography" &c.

The meeting then terminated.

Meeting held on the 11th December.—Hon. B. H. Jones, Vice-President, in the chair.

There were 19 members present.

Elections.—*Members*: Messrs. A. das Neves e Mello, D. D. Barnes and W. J. Fuller.

Associate: Mr. John Gomas.

The Secretary read a letter from the Government asking for information as to the organization of Colonial Exhibitions, on behalf of the colony of Natal, which was referred to the Committee of Correspondence.

The Chairman said that he had been called upon to give a summary of the work of the Society during the past year, but he could hardly do so, as such a *resumé* as had been given in previous years would require a great deal of preparation. It had been their great misfortune to lose their President, Mr. R. P. Drysdale, during the current year, and during the short time he (the Chairman) had been acting as President, he had not been able to find time to prepare such a statement as might be expected. He would, however, call the attention of the Society to a few matters, which he thought worthy of consideration. Among the Committees appointed at every annual meeting, were the Agricultural and Commercial Committees. Since the establishment of the Chamber of Commerce he understood that the latter Committee had held no meetings. The Agricultural Committee, he found, had not met for two years, but since he had been elected as Chairman of that Committee he had tried to revive it as much as lay in his power. The result had been that seven or eight meetings were held during the year, at which several important matters came up for discussion, among them being the labour question. The Government having applied to the Society for information as to the wages of agricultural labourers, on

behalf of the Government of Barbados, the matter was referred to that Committee, which gave it their most careful attention. The report which had been drawn up by the Committee was considered satisfactory by the Government of Barbados, and he hoped the tariff of wages would induce a good number of labourers to come here from that island. Another matter that came before the Committee, was the experiment of Mr. Jenman in raising canes from seed. In Barbados, this matter had received, and was still receiving, very great attention, and as far as it had gone, with good results. Here, however, there was a very great difficulty as Mr. Jenman had no properly drained land for the purpose. He (the speaker) had offered a piece of land on Pln. Houston for the experiments, but up to the present he believed nothing had been done. If the Government refused to assist in this matter, they would be far behind their neighbours in Barbados. The Committee had also considered the Banana question, on which as they all knew no definite decision had been arrived at, pending another visit from Capt. Baker. He thought it was as well for the colony generally that the industry had not been commenced last year, as on account of the heavy wet seasons the canes had been seriously injured, while many acres of plantains and bananas were entirely destroyed. He hoped, however, that the Society would not neglect this important matter, for what had been done in Jamaica might as easily be accomplished here, if the necessary energy and capital were perseveringly applied. By the ship *Sheila* some samples of paddy rice had been received, which on the recommendation of the Committee had been sent to Mr. Jenman for experiment. He was

sorry to say that Mr. Jenman had written to the Secretary, stating that he had neither land nor means at his disposal to carry out these experiments. This matter might again be taken up by the Society, and the Government asked to give their assistance, as it was desirable that the cultivation of rice should be encouraged. These were the principal matters that had been considered by the Committee. They had not done as much as he would have liked by a long way, but he hoped that better work would be accomplished in the future.

Mr. Mackay called attention to the fact that, since the present Harbour Master had been appointed, the list of passengers by the mail steamer had not been supplied. As it was a great convenience to the members he would be glad if the Directors would endeavour to make arrangements with the Purser or otherwise, so that the list might be again posted up as formerly.

The Chairman said he had no doubt the matter would be looked into, and if possible, the lists procured.

The Secretary stated that he had prepared a short account of the work done by the Society, in the present year, in hopes that it might stimulate them to further exertions and a better attendance at the meetings. Notwithstanding that there were over 200 members living in town, the average attendance at the eleven ordinary meetings had been below thirteen. He thought it a pity that the Society did not get more encouragement from the merchants in Water Street who were members. There had been three special meetings during the year, at which the Imperial Institute, the Banana project, and the importation of agricultural labourers, had been considered. He was glad to say that the roll of members

had been increased by 59 so that the total of members, associates, and lady subscribers was now 504; this he thought was very satisfactory. Five lectures had been delivered in the course of the year, three of them by Mr. Luard, in one of which he was assisted by Mr. H. H. Cunningham, one by Mr. Gladwin and one by Mr. Vyle. He thought the thanks of the Society were due to all these gentlemen, as well as to Mr. Hawtayne, who, although not lecturing himself, had been instrumental in getting them up. During the year 373 volumes of new books had been added to the Library, making a total of 15,300.

The Hon. Dr. Carrington called attention to the meagre accommodation provided for the meetings, which might tend to keep away members, and suggested that they should be held in the Reading Room instead of the gallery. Mr. Kirke stated that when meetings were held in the Reading Room, they found a difficulty in hearing what was said, and therefore they had removed to the gallery. The Chairman called attention to the Exchange Room, which had been used for some time as the place of meeting, and thought that the Directors might consider the matter in the course of the month.

Mr. Kirke (in reference to the address of the Chairman) called attention to the fact that some samples of paddy rice were received by the Society from Calcutta in 1887, and grown by Mr. Minty, whose report could be found in "Timehri" for that year.

The election of Office-Bearers for 1891 was then proceeded with. On the proposition of Mr. Hawtayne seconded by Mr. Austin, the Hon. B. Howell Jones was elected President, and on that of Mr. Mackay, seconded

by Mr. Kirke, the Hon. Dr. Carrington as Vice-President. The other Directors and Office-bearers were allowed to remain as in 1890, except that as Mr. A. G. Clarke had been elected an Ordinary Director his place as Exchange Room Director was filled by Mr. J. J. Dare. The Agricultural Committee was allowed to remain as before except that Messrs. Nind and G. Garnett, being out of the colony, were struck off and Mr. Jenman added. Some discussion took place as to the necessity of retaining the Commercial Committee, but on the motion of Mr. Winter, seconded by Dr. Carrington, it was allowed to remain, with two or three alterations. The Committee of Correspondence was then proposed to be left as before, but an amendment was proposed by Major Walthall and seconded by Mr. Mackay, that as a smaller number of members would be likely to work better, the number be reduced to ten. This being put to the vote, was carried by seven against six, several members remaining neutral; it being understood that this vote was not to hamper that Committee in any way, or prevent their adding to their number if necessary. The Committee was then elected. The Book Committee was allowed to remain, with slight alterations, and the Resident Director in London was re-elected.

The thanks of the Society were accorded for the following donations :—

- | | |
|---------------------|------------------------------------|
| From G. H. Hawtayne | ... Four rubbings from Tombs. |
| „ Neville Lubbock | ... Reports on Manures. |
| „ Dr. A. Matthey | ... Physical Geography of the Sea. |

The meeting then terminated.

Office-Bearers for 1891.

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Librarian and Assistant Secretary: JAMES RODWAY, F.L.S.

Resident Director in London: NEVILLE LUBBOCK.

List of Popular Science Lectures.

21.—“THE HIGHLANDS OF SCOTLAND.”

*Delivered on Tuesday, July 1st, by E. C. Luard, Manager,
Plantation La Bonne Intention.*

 HE lecture consisted of explanatory information of a series of more than fifty views of the most noteworthy places of interest in the Highlands, shewn by means of an optical lantern with the oxy-hydrogen light.

22.—“THE TELEPHONE : ITS INVENTION AND USE.”

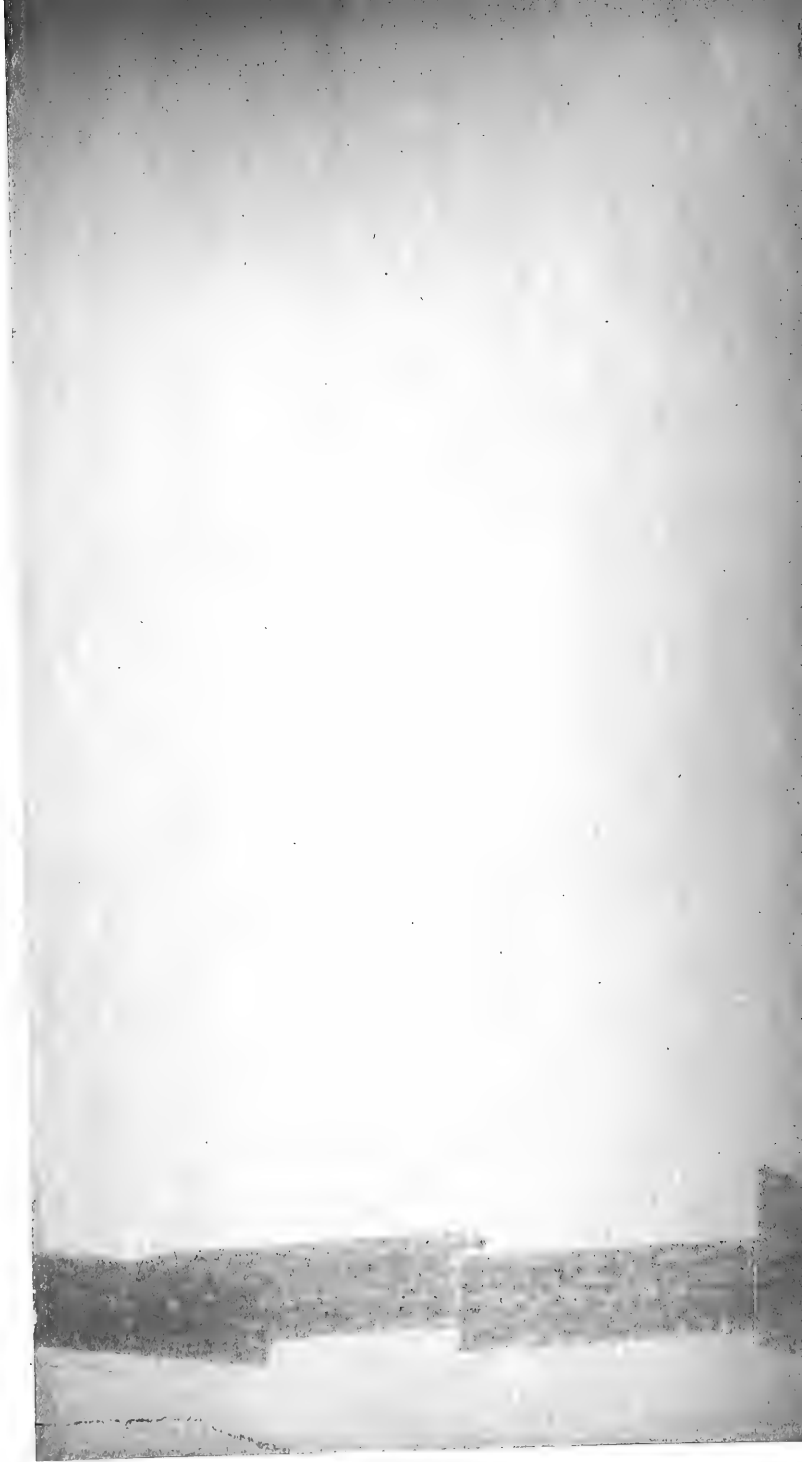
*Delivered on Thursday, July, 31st, by S. Vyle, A. Inst. T.E.,
Government Electrician.*

The lecturer began by tracing the early history of the Telephone, special mention being made of the various steps in its development brought about by Sir Charles Wheatstone, Dr. Page, Edison and Hughes, etc. An account of its introduction into practical service in the United States was then given, together with its introduction into the colony. Detailed mention was then made of the new telephones just introduced and of the method of manipulation ; and an explanation was given of the various transformations of energy that took place during the transmission of vocal sounds.

23.—“WINDSOR CASTLE.”

*Delivered on Monday, November 3rd, by E. C. Luard and
H. H. Cunningham, B.A.*

More than forty photographic lime-light views of Windsor Castle and its neighbourhood were shown by Mr. Luard, explanatory information of which was given by Mr. Cunningham.



[ADVERTISEMENT.]

“T I M E H R I,”

BEING THE

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Society of British Guiana,

EDITED BY

J. J. QUELCH, B. Sc., C.M.Z.S., of University College, London

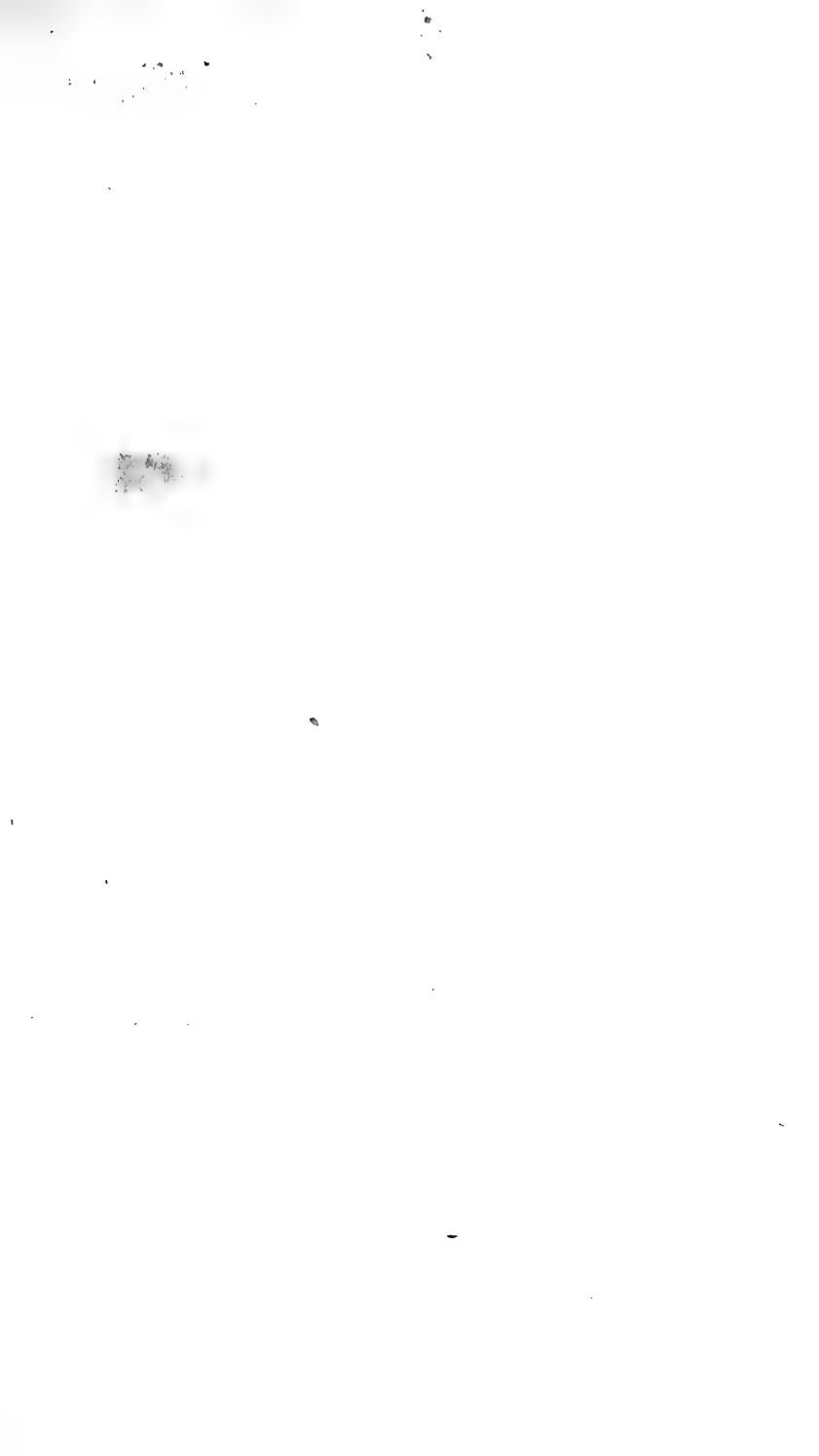
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